

AIA AUTOMOTIVE INDUSTRIES

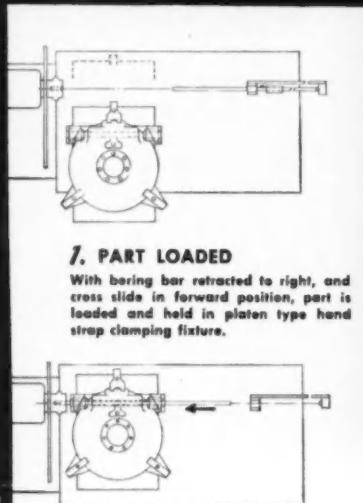
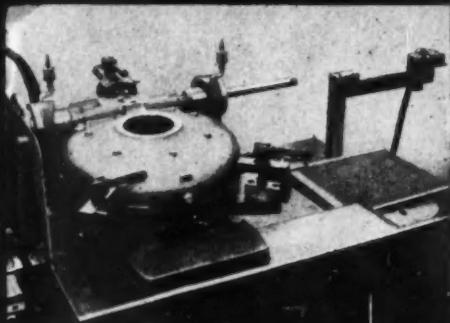
AUTOMOTIVE and AVIATION MANUFACTURING
CIVILIAN AND DEFENSE

In This Issue . . . Foundry Automation . . . M48 Tank and Engine

DECEMBER 15, 1952 Production . . . Engineering Quality Control

Complete Table of
Contents, Page 3 . . . Transit Low Cost Buses . . . Magnesium
Developments . . . PanAmerican Race Highlights

A CHILTON PUBLICATION



1. PART LOADED

With boring bar retracted to right, and cross slide in forward position, part is loaded and held in platen type hand strap clamping fixture.

2. BORING BAR INSERTED

With cross slide indexed to boring position, boring bar is inserted through support bearings and hole in work, and locked in place by drive adapter on boringhead. Only one set of tools is used as tools are not fed through work prior to boring.

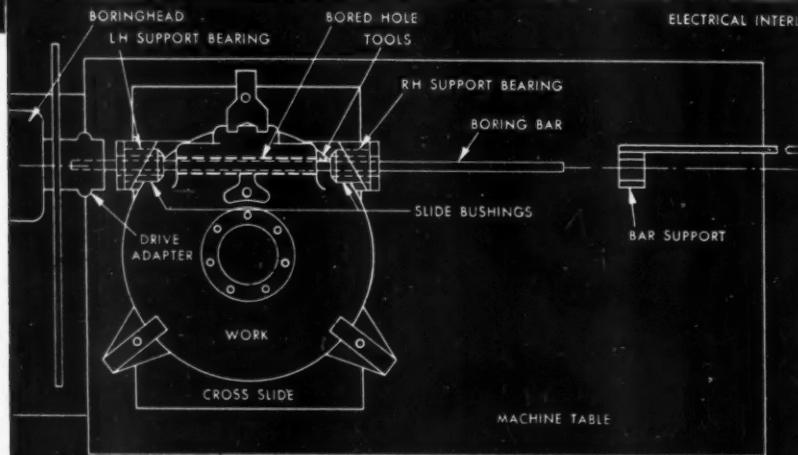
3. BORING STROKE

As table is traversed to right, boring bar tools are, in effect, "pulled" through the bore. Table then cuts bores left to eliminate drag line.



*Heald precision speeds
the nation's production*

SEPARATE SUPPORT solves long-bore problem



Plan view of tooling set-up utilizing separately supported boring bar for precision boring of long, small-diameter holes.

Heald Model 224 Bore-Matic with separate boring bar arrangement gives chatter-free finish to long, small-diameter holes

• Where the length to diameter ratio of a bored hole exceeds the limitations of a damped quill, a separate boring bar arrangement may provide an effective solution to the problem: The above set-up of a Heald Model 224 Bore-Matic for boring large magnesium cases is a typical example.

The boring bar, while in operation, is supported in double outboard slide bearings, one on each side of the work. This provides ample rigidity for smooth, chatter-free boring throughout the length of the bore. The boring bar cradle at the right of the table includes an electrical interlock switch so arranged that the bar must be completely retracted from the work before the cross slide can be indexed to the loading and unloading position.

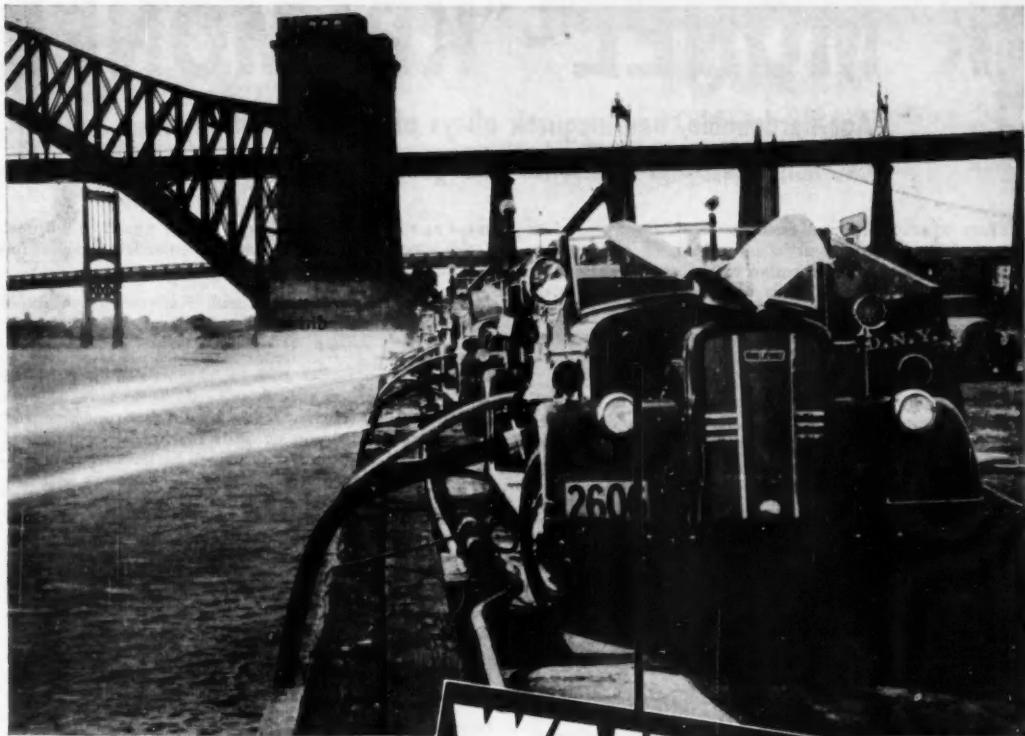
Remember—when it comes to precision finishing, it pays to come to Heald.

INTERNAL AND ROTARY SURFACE GRINDING MACHINES AND BORE-MATICS

THE **HEALD** MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

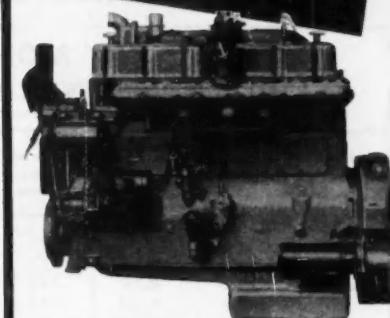
Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York



no vibration
all power with

WAUKESHA FIRE FIGHTER ENGINES

Hoses spouting...hoods up...engines running—yet even the eagle-eyed camera detects no movement of the trucks resulting from vibration. Their engines are Waukeshas! Here on Ward's Island in the East River you see the New York City Fire Dept. running a pump test on five of 27 new Ward LaFrance 85-T 750-gallon pumbers powered with Waukesha 145-GKB Fire Fighters, recently delivered to them. All 27 trucks—20 pumbers, 7 quadruple combinations—have 250 gallon booster tanks, deck guns, radios, life nets; and went into service with scaling ladders. Each quad, in addition to its 750-gallon pump, has a small 100 g.p.m. pump so it can keep moving, as at a brush fire—yet by simply opening the power take-off valve, can throw a good stream through its booster hose line.



WAUKESHA Model 145-GKB High Output FIRE FIGHTER Engine—Six-cylinder, 5 1/4-in. bore x 6-in. stroke, 779 cu. in. displ.; develops 240 hp at 2400 rpm. Arranged for full electrical equipment, air brake compressor and all modern accessories. Send for Bulletin 1594.

WAUKESHA MOTOR COMPANY •
NEW YORK

TULSA

WAUKESHA, WISCONSIN
LOS ANGELES

196

"K" MONEL and "KR" MONEL

Age-hardenable, non-magnetic alloys offering high strength, excellent corrosion-resistance and good working properties

Where stressed structural members must be placed close to sensitive electro-magnetic equipment, or where extra strength is needed in corrosive environments, these Inco Nickel Alloys offer solutions to the problems of metal selection.

Both alloys show improved strength and hardness at sub-zero temperatures. And both alloys provide moderate strength at temperatures to 900°F.

"K"® Monel and "KR"® Monel are similar in composition and properties. "KR" Monel has better machinability and is recommended for parts requiring intricate machining.

The principal engineering characteristics of these alloys are:

Tensile Properties: "K" Monel in the fully age-hardenable condition has a minimum yield strength (0.2% offset) of 100,000 psi and a tensile strength of over 140,000 psi, with minimum elongations (in 2 in.) of 15% and 20% for cold-drawn and hot-rolled materials respectively. "KR" Monel, age-hardenable, has a minimum yield strength (0.2% offset) of 90,000 psi with minimum elongation of 20% (in 2 in.) for as-rolled material.

Shear Strength: The shear strength of "K" Monel, as determined with .050-in. x .250-in. specimens subjected to double shear, is (full hard, age-hardenable) 98,450 psi maximum, with 0.04 in. deflection. The shear strength of "K" Monel rivets, fully age-hardenable, is 89,200 psi with ultimate tensile strength of 147,000 psi.

Spring Properties: "K" Monel wire can be cold-drawn and age-harden to develop 160,000 to 200,000 psi tensile strength. The torsional proportional limit of cold-drawn, age-harden wire is about 40% of the ultimate tensile strength.

Endurance Limit: In rotating beam tests of polished speci-

mens at room temperature and 10,000 r.p.m., "K" Monel (cold-drawn, age-harden) showed an endurance limit for 10⁸ cycles of 41,000 to 59,000 psi.

Magnetic Characteristics: "K" and "KR" are non-magnetic under ordinary conditions and remain so at sub-zero temperatures.

Working Characteristics: Both "K" Monel and "KR" Monel may be hot-worked, forged, and cold-worked. "K" Monel may be readily machined in the annealed condition and may be considered commercially machinable at practical rates in other conditions with Brinell hardness of up to 275. "KR" Monel, because of higher carbon content and special thermal treatment, has better machinability than "K" Monel and is recommended for parts requiring more intricate machining. Because of greater hardness, both alloys will take a higher polish than Monel. Both may be joined by the usual welding, brazing, and soldering processes.

Corrosion Resistance: These alloys are highly resistant to attack by most commonly-encountered corrosives, including mineral and organic acids, alkalies, salts, potable and industrial waters, foods, organic compounds, and oxidizing atmospheres at normal and elevated temperatures.

Forms Produced: "K" Monel is supplied in most commonly-used mill forms—rods, hexagons, squares, flats, strip, sheet, seamless tubing, wire, welding materials—and in a variety of finishes and conditions. "KR" Monel is produced in rods, hexagons, squares, hot-rolled and cold-drawn.

Applications: Because these alloys retain their non-magnetic, corrosion-resistant, and high physical qualities at abnormal temperatures, they have been used to advantage in aviation instruments, roller chains for retractable landing gear, controls, springs and contact arms in electrical equipment, in stressed structural members and fastenings.

FURTHER DATA AVAILABLE

A 23-page reference manual, *Engineering Properties of "K" Monel and "KR" Monel*, contains all essential engineering information on these alloys. It is available, free, for your files.

Nickel alloys are being increasingly diverted to defense applications. However, technical help for metal problems involving corrosion, high temperatures or fatigue is available from INCO's Technical Service, either for immediate defense needs or for future installations.

Inco Nickel Alloys

MONEL® • "R"® MONEL • "K"® MONEL
 "KR"® MONEL • "S"® MONEL
 NICKEL • LOW CARBON NICKEL
 DURANICKEL® • INCONEL® • INCONEL "X"®
 INCOLOY® • NIMONICS®



| "K" MONEL | | | | | | |
|---|-----------------------------------|-----------------------|------------------------------|---|--------------------|-------------------------|
| Effect of temperature on physical properties | | | | | | |
| (Age-harden condition) | | | | | | |
| Test Temperature °F. | Yield Strength (0.2% offset) psi. | Tensile Strength psi. | Elongation in 2 in. per cent | Creep Strength (0.10% in 10,000 hr.) psi. | Hardness (Brinell) | Impact (Charpy) ft.-lb. |
| -300 | 160,200 | 202,000 | 27 | ... | ... | ... |
| -110 | 134,600 | 171,550 | 17.3 | ... | 36 (Rock. C.) | 27 |
| Room | 111,000 | 160,000 | 23.5 | ... | 331 | 27 |
| 200 | 108,000 | 150,000 | 23.5 | ... | ... | ... |
| 400 | 103,000 | 149,000 | 24 | ... | ... | ... |
| 600 | 105,000 | 146,000 | 23 | ... | ... | ... |
| 750 | ... | ... | ... | 67,000 | ... | ... |
| 800 | 105,000 | 124,000 | 8.5 | 48,000 | 302 | ... |
| 1000 | 92,000 | 95,000 | 3 | 8,500 | 255 | ... |
| 1100 | ... | ... | ... | ... | 229 | ... |
| 1200 | 80,000 | 80,000 | 1.5 | ... | ... | ... |
| 1400 | 30,000 | 45,000 | 8 | ... | ... | ... |

**NEW Pangborn Continuous-Flo ROTOBLAST®
BARREL installed in another
automobile plant**

**Initial performance
shows 59% saving
over former cleaning
method**



EARLY reports from one of America's foremost automobile makers show its new Pangborn *Continuous-Flo ROTOBLAST* Barrel increases production and reduces costs. Forgings are cleaned at a *59% saving* over pickling . . . including all costs for materials, maintenance, power and labor!

Labor costs are down because manual handling is eliminated. Cleaning has been stepped up to an average rate of 12 tons per hour . . . 17 tons an hour on some forgings. And a public relations problem has been solved because pickling acid no longer pollutes nearby streams.

GET THE FACTS ON PANGBORN ROTOBLAST. Whether you pickle or clean with multiple batch equipment or tumbling mills . . . Pangborn has a ROTOBLAST Machine to clean faster, better and cheaper. Bulletin 214 gives full details. For your free copy write: Pangborn Corp., 3900 Pangborn Blvd., Hagerstown, Md.

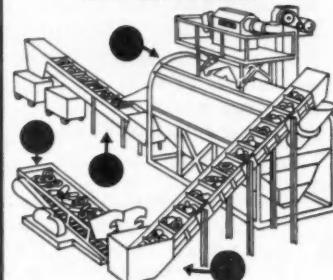
**Look to Pangborn for the latest developments in
Blast Cleaning and Dust Control equipment**

*TRADEMARK
OF PANGBORN
CORPORATION

Pangborn

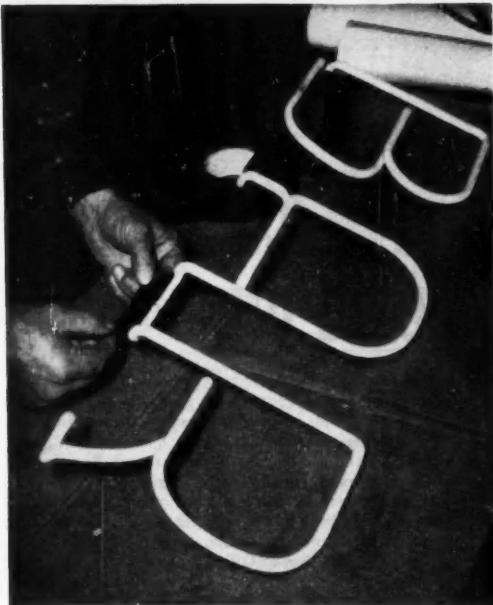
**BLAST CLEANS CHEAPER
with the right equipment for every job**

**Operation is Automatic
and Continuous**



1. *Forgings are dumped from tubs onto an independent loading conveyor.*
2. *An integral flight conveyor feeds forgings to Barrel at an even rate.*
3. *Work moves continuously through Barrel while being cleaned by two ROTOBLAST streams.*
4. *Forgings are discharged from Barrel to tubs by automatic conveyor. No manual handling is necessary.*

WEATHERPROOF TAPE replaces outdoor paint



Permanent blackout! Polyken Tape No. 214 is used to black out sections of neon tubing quickly and permanently.

Neon sign maker solves costly maintenance problem on outdoor installations

Appleton Neon Sign Co., Wisconsin, used to black out non-illuminated sections of neon tubes with paint. But the paint would weather off, and the blacked-out sections began to light up, creating a troublesome and expensive maintenance problem.

The answer was simple and effective: use black weather-resistant Polyken Tape No. 214 instead of paint.

Then for splicing high-voltage electrodes, the sign



Long-life splices. Electrodes that will carry more than 6,000 volts are spliced with Polyken No. 822, which has a 10,000 volt dielectric strength.



This inside job of bundling wires is made-to-order for low-cost Polyken Tape No. 163.

company switched from a vinyl plastic tape to Polyken's exclusive Polyethylene Tape No. 822. The change not only cut costs but also resulted in higher dielectric strength (over 10,000 volts) and greater insulation resistance (over 1,000,000 megohms) at the same time.

Finally costs were cut still further by a switch to Polyken Electrical Tape No. 163 for taping interior electric connections and holding wires for bundling.

These tapes are just three of a complete line of Polyken pressure-sensitive tapes made to save you time and money. Send for free samples and booklet today.

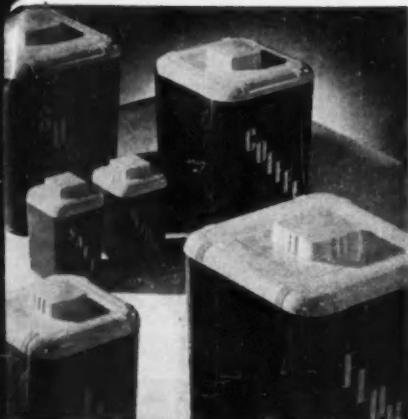
TAILORED TO YOUR JOB
Polyken®
INDUSTRIAL TAPES

Department of Bauer & Black
Division of The Kendall Company

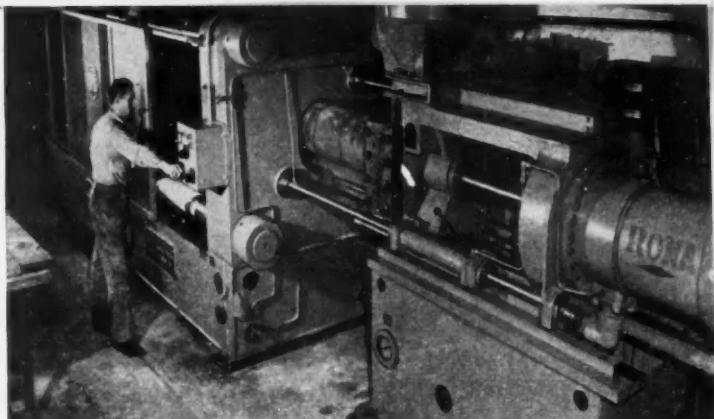
Polyken, Dept. AIM
222 West Adams St., Chicago 6, Illinois

For specifications, samples, and further information on Nos. 163, 214, 822 and other Polyken Tapes, please send me your FREE BOOKLET, "Tape is a Tool."

Name Title
Company
Street Address
City Zone State



NO MORE PROBLEMS. The production of plastic household items by Rona Plastic Corporation was slowed down by an inadequate hydraulic oil. A switch to Sunvis 999, over a year ago, restored it to normal.



PRESSURE LOSSES ENDED. There are few plastic molding machines as big as this 60 ounce model. It exerts a pressure of 1,000 tons. Because the hydraulic oil formerly used sludged up and thinned out, it could not maintain this pressure. But Sunvis 999 has fully met these severe requirements, as well as those of Rona's nine other hydraulic machines of varying sizes.

PLASTIC MOLDER'S BOTTLENECK ENDED BY SUNVIS HYDRAULIC OIL

More than a year ago Rona Plastic Corporation, New York City, had trouble with its hydraulic molding machines. The machines functioned erratically due to oil sludge sticking the control mechanisms. In addition, the oil thinned out excessively at normal operating temperatures, and resulted in the loss of proper clamping pressures on the dies. To keep the machines going at all, it was necessary to drain, clean, and entirely recharge the systems at frequent intervals.

A Sun representative, called in by Rona, studied the problem and recommended Sunvis 999. He knew it would

put an end to pressure losses, because, even at elevated temperatures, it does not decrease in viscosity as much as most other oils. He also knew its exceptional stability would end the sludging problem.

Sunvis 999 proved to be the answer to all Rona's hydraulic oil problems. The original charges, with minimum make-up, are still giving good service. Rona can expect the same performance for a long time to come, because experience shows that under normal operating conditions, Sunvis 900 Series Oils are *good for the life of the equipment*.

Department AA-12

Sun Oil Company, Philadelphia 3, Pa.

I am interested in knowing more about Sun Hydraulic Oils. I would like to consult with a Sun representative. Send the booklet "Hydraulic Fundamentals and Industrial Hydraulic Oils."

Name _____

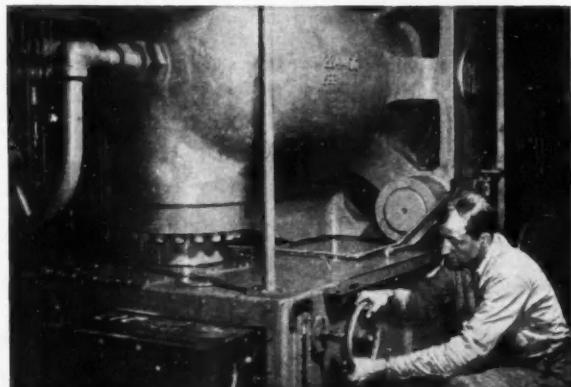
Title _____

Company _____

Address _____

City _____ Zone _____ State _____

TECHNICAL ASSISTANCE AVAILABLE. Sun's engineers are at your service for consultation on all hydraulic oil applications. It will pay you to utilize the experience they have gained in solving a wide variety of problems in many different industries.

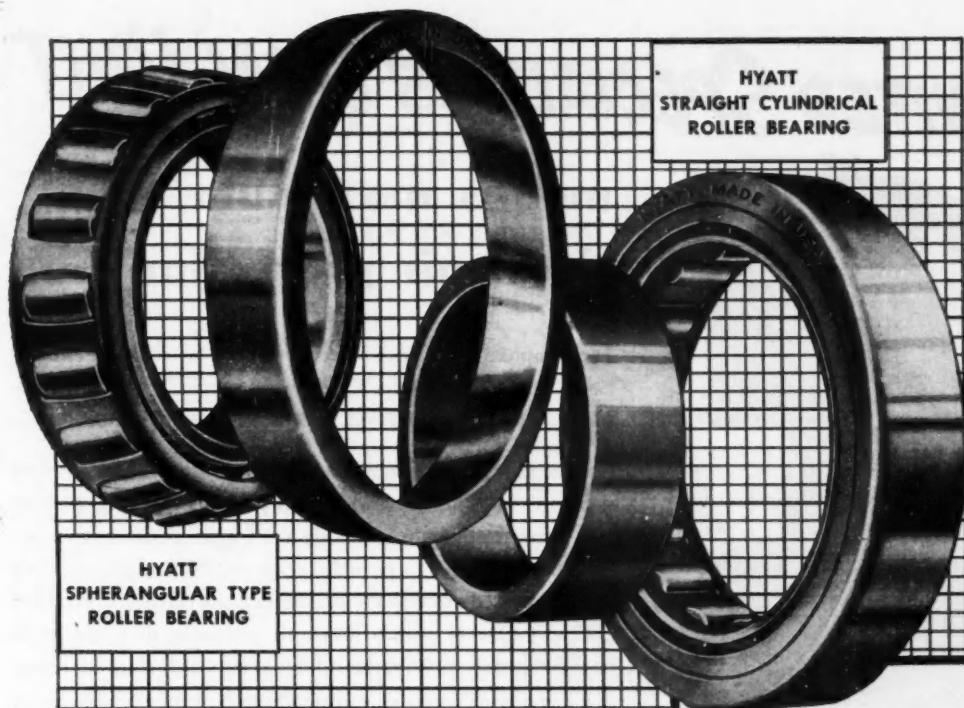


NO OIL CHANGES HAVE BEEN NEEDED. Before Sunvis 999 was adopted, the oil in each of the machines had to be changed frequently (the one pictured holds 450 gallons). The original charges of Sunvis 999 have been in use now for more than a year.

SUN INDUSTRIAL PRODUCTS

SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO AND MONTREAL



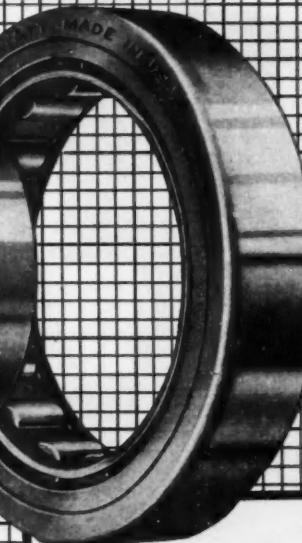


YOU'LL find the proof in the millions of cars, trucks and buses for which design engineers select Hyatt Roller Bearings to solve a variety of anti-friction problems.

Hyatt Quiet Roller Bearings are preferred for their design, quality, precision and ease of assembly. They can always be depended on to do the assigned job.

Hyatt better bearings are made in a wide range of sizes and types, each designed for specific operating conditions. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey; Detroit, Michigan.

HYATT
STRAIGHT CYLINDRICAL
ROLLER BEARING



For
Automotive
Applications
the Preferred
Roller
Bearings
are
HYATTS

HYATT ROLLER BEARINGS

UNITED SPECIALTIES DUAL UNIT



means maximum clean air protection

For complete air cleaner protection under extreme dust conditions, United Specialties Company provides a two-way safe-guard — a combination oil bath air cleaner and pre-cleaner.

The pre-cleaner removes a large percentage of dust before it can get into the air cleaner. This prevents clogging, permits air cleaner to operate efficiently for longer periods, saves air cleaner oil changes — provides extra engine protection. After air is processed through the pre-cleaner, the efficient United Oil Bath Air Cleaner goes to work on remaining dust and other harmful abrasives. With this double action, only clean air comes in contact with precision-machined combustion chamber parts, thus greatly increasing engine life.

With over 15,000,000 air cleaners produced . . . with over 30 years of air cleaner building experience . . . with a wide variety of models available, United Specialties Company is best equipped to handle your specialized air cleaner and pre-cleaner requirements.

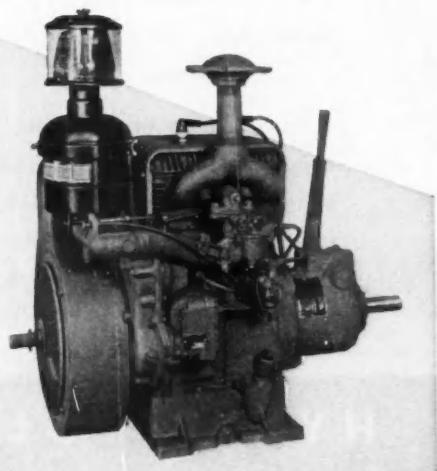
We invite your inquiry.

Wisconsin Engines Protected by UNITED

Wisconsin Motor Corporation, world's largest builder of heavy-duty air-cooled engines, is one of many well-known manufacturers who use United air cleaners as original equipment. Illustrated is the Model TF, Wisconsin air-cooled engine equipped with United Oil Bath Air Cleaner and United Pre-Cleaner.

**UNITED
SPECIALTIES COMPANY**

United Air Cleaner Division — Chicago 28
Birmingham 11, Alabama
Mitchell Division — Philadelphia 36

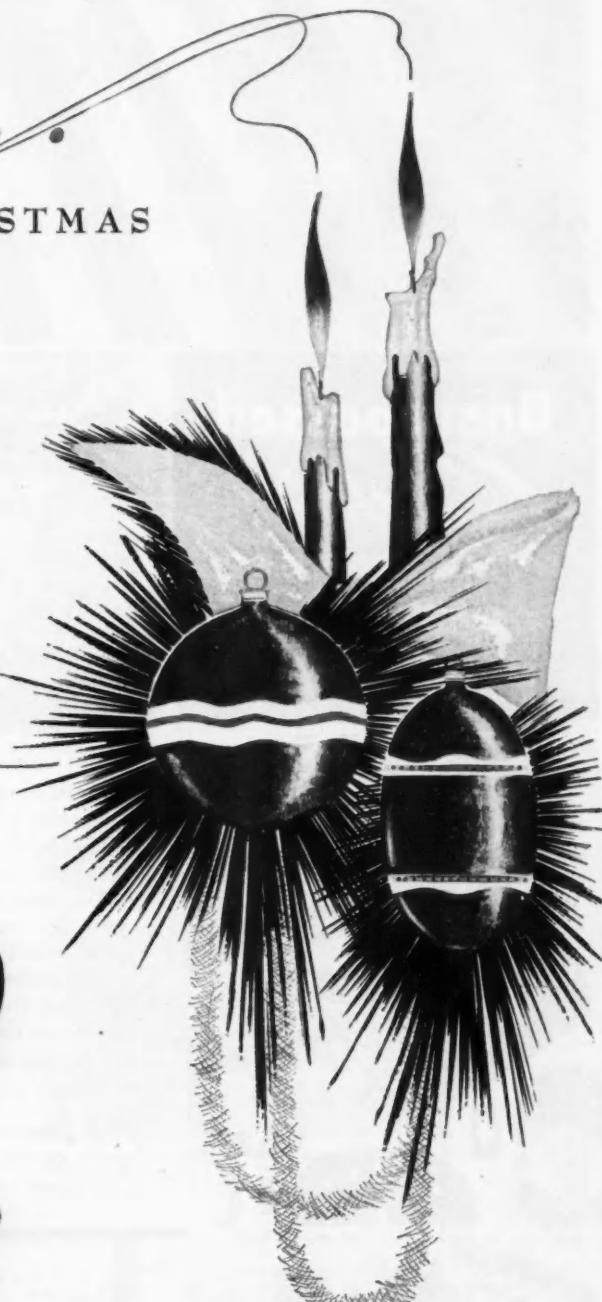


Again... IT'S CHRISTMAS

*And again... as we have done
every year since 1906...
we pause in our business tasks
to thank our
friends and customers...*

*And to express the hope
that we shall continue
to merit your goodwill
in the years to come.*

*To You and Yours...
Merry Christmas*

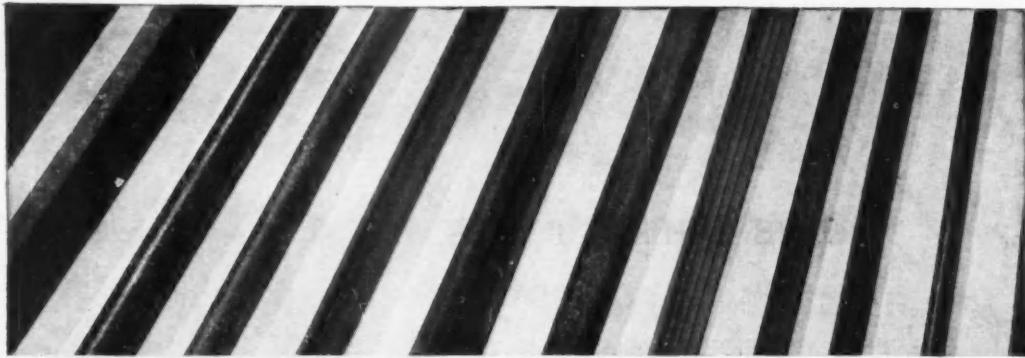


ROSS

Cam & Lever STEERING

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

AUTOMOTIVE INDUSTRIES, December 15, 1952



Unsurpassed
Synthetic
RUBBER
&
COMPONENT
PARTS



Users of Acadia Synthetic Rubber component parts in hundreds of industries have found them unsurpassed. No matter what function synthetic rubber must perform, depend on Acadia parts. They best meet exacting specifications and operating conditions such as moisture, oil, heat, wear and age resistance. Molded, extruded, die-cut to close limits—compounded to meet specific conditions. Acadia engineers will gladly cooperate.

Sheet and Roll Felt Manufactured for Special Purposes and To Meet All S.A.E. and Military Specifications.

- Seals
- Gaskets
- Washers
- Cups
- Channel
- Strip
- "O" Rings
- Sheet
- Tubing
- Roll Goods
- Cut Parts
- Lathe Cut Washers



ACADIA

Processors of Synthetic Rubber
and Plastics • Sheets
Extrusions • Molded Parts

Synthetic
PRODUCTS

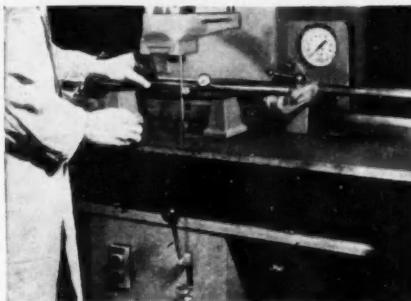
DIVISION WESTERN FELT WORKS
4035-4117 OGDEN AVENUE • CHICAGO 23, ILLINOIS

WITH HANNIFIN·PRESSES

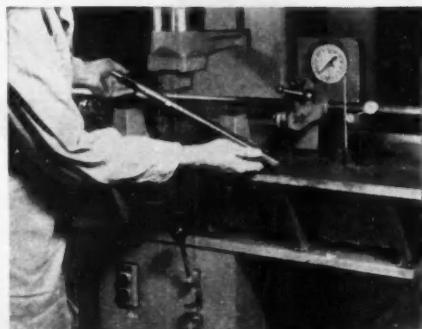
YOU STRAIGHTEN BY EYE!

HERE'S HOW AND WHY:

See how easy and quick straightening operations are with Hannifin Hydraulic Straightening Presses. The answer is Hannifin's exclusive, Sensitive Pressure Control . . . so sensitive that a touch of the finger causes the press to respond. With it an operator quickly becomes skilled at "straightening by eye." Ability to stop . . . re-start . . . or retract assures safety. Capacities to 150 tons. Investigate how to speed work . . . improve uniformity with Hannifin Straightening Presses. Hannifin Corporation, 1143 S. Kilbourn Ave., Chicago 24, Ill.



2. Operator rotates rod against deflection indicator. Dial reads .008 at point of maximum deflection.



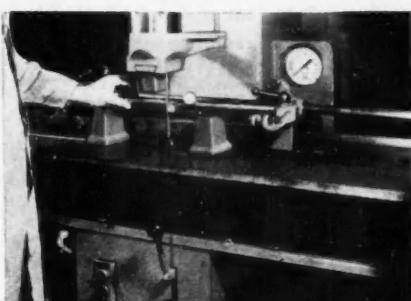
1. Rod to be straightened is placed in fixture on Hannifin 25-ton Straightening Press.* Centering fixture available.



3. Operator moves Sensitive Pressure Control slightly, ram moves down just enough to overcome springs of roller fixture and bring rod down on table blocks. (Note pressure gauge has barely moved off zero.)



4. Now operator "straightens by eye." Light finger touch bends rod just beyond yield point so it will take permanent "set" in desired direction. (Gauge shows press exerting force of 6 tons—but operator watches rod—not gauge.)



5. Sensitive Pressure Control is released and rod again rotated against indicator . . . deflection is .001, well within limits. Next piece!

NOTE: For simplicity, we have assumed that the operator got exactly the correction he needed on one try. While this often happens, the usual sequence is bend and try, bend and try. As you can see, however, successive bends can be made very quickly.



WRITE FOR BULLETIN 130

Hannifin Corporation, 1143 S. Kilbourn Ave., Chicago 24, Illinois
Please send me Bulletin 130 on Hannifin Hydraulic Presses. I understand it includes information on Hannifin Straightening Presses.

Name.....

Position.....

Company.....

Address.....

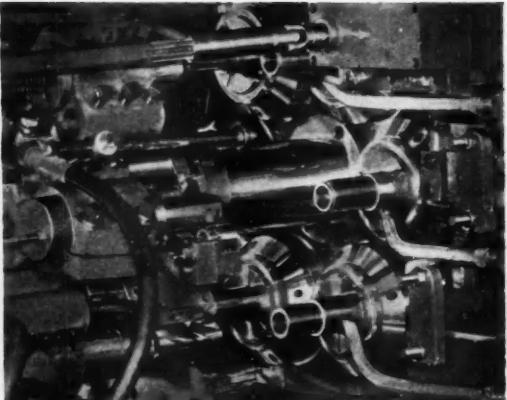
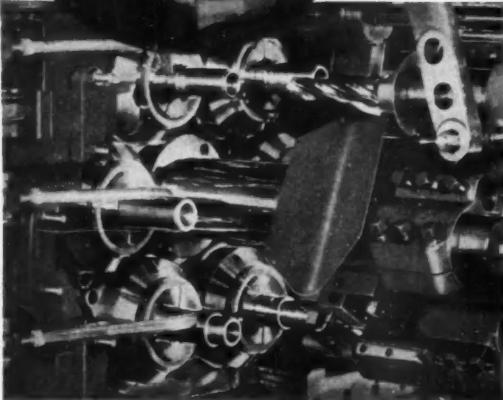
City..... State.....

HANNIFIN

Hydraulic Presses • Pneumatic Presses • Hydraulic Riveters
Hydraulic Cylinders • Air Cylinders • Air Control Valves



NO NEED TO "SETTLE" FOR LESS



FRONT AND REAR SIDES OF 2 1/2-SIX

Multiple Spindle Bar Automatics produce more work per square foot of floor space than do other types of metal cutting machine tools. But, when *one* spindle is "down" *all* are "down." It's why dependability will always be the outstanding requirement of the "Automatic."

So many factors are involved in dependability that any weakness in design, engineering, material, or construction, will eventually contribute to higher costs of operation and maintenance.

Part of any new machine's service to the prospective user is the availability of *full* information. No prospective purchaser need "settle" for less. At least it's that way with CONOMATICS.

In producing the piece shown, on a 2 1/2-SIX, the eccentric forming attachment (see upper right illustration) combines the well known CONOMATIC facilities of form tool support and "all position" attachment spindle drive.



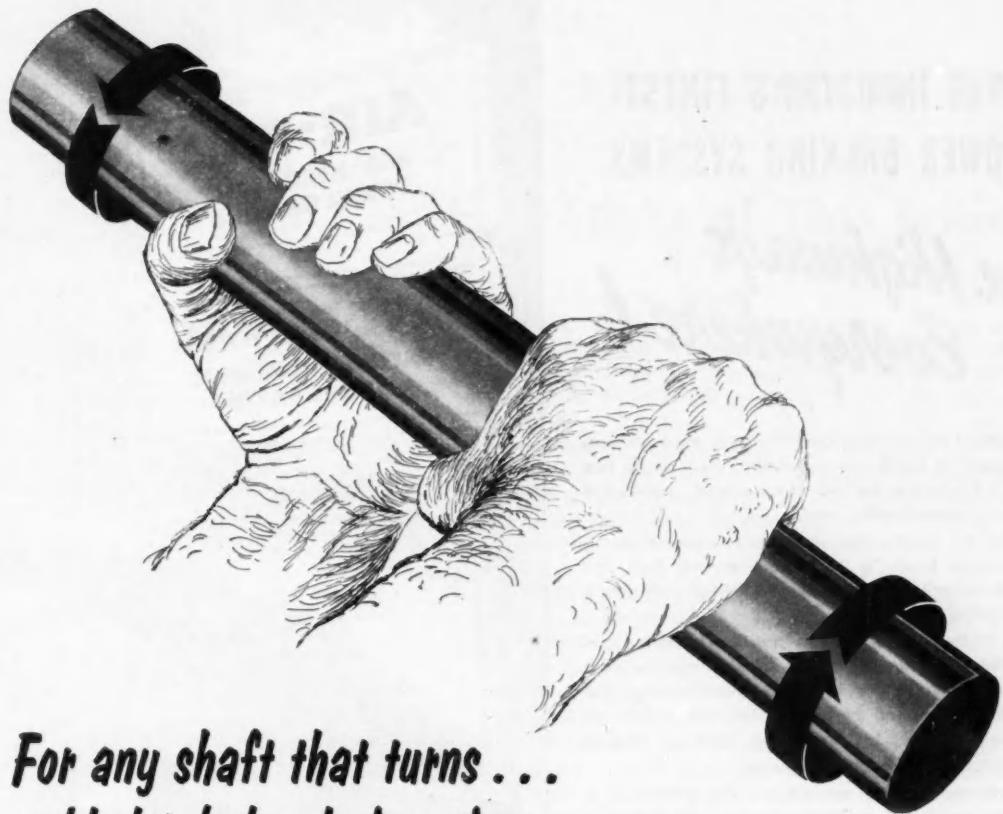
A Comparison of ALL Automatics is in favor of Cone



Conomatic

CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

AUTOMOTIVE INDUSTRIES, December 15, 1952



*For any shaft that turns . . .
welded tubular design gives
the most strength at the least weight!*

• Pound for pound, a tubular section will carry more torsional load than any other shape. This, plus ease of fabrication, accounts for the universal use of electric-welded steel tubing for automotive drive shafts, torque tubes, etc.

Investigate the economy and physical advantages of Brainard welded steel tubing for your products. Write Brainard Steel Division, Dept. W-12, Griswold Street, Warren, Ohio. An integrated producer; offices throughout the U. S.



•WELDED STEEL TUBING

THE INDUSTRY'S FINEST POWER BRAKING SYSTEMS

*on highways
Everywhere!*

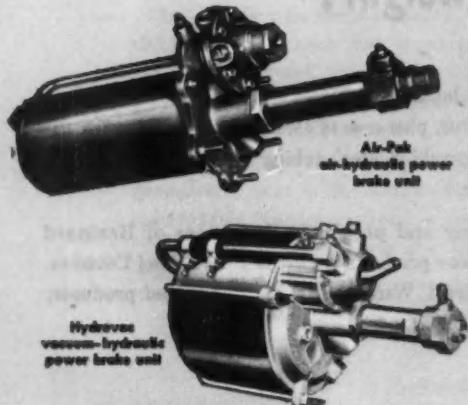
Regardless of the size of vehicle or whether the preference is for vacuum or air, the trucking industry has come to look to Bendix Products as the one source uniquely qualified to meet every power braking need.

Hydrovac, the world's most widely used power brake, is the undisputed leader in the vacuum-hydraulic field. And Air-Pak is recognized as foremost in the field of air-hydraulic power braking units.

Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and the air actuated units, brakes can be applied instantly by foot power alone—a constant safety factor of tremendous importance.

That's why on highways everywhere the preference is for Bendix Hydrovac® or Bendix Air-Pak, the Industry's Finest Power Braking Systems.

REG. U. S. PAT. OFF.



BRAKING HEADQUARTERS for the AUTOMOTIVE INDUSTRY

**BENDIX • PRODUCTS
DIVISION • SOUTH BEND**

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AUTOMOTIVE INDUSTRIES

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High Spots of This Issue

★ Pan-American Race Highlights

The mighty 205-hp 1953 Lincoln and the speedy Mercedes-Benz carried off top honors in the recent grueling Pan-American Race. Presented here is an eye-witness account of the contest including individual car performances. Page 32.

★ From Open Fields to Tank Production in 18 Months

Miraculous is the achievement of the Chrysler Delaware Plant in rolling the first T-48 tank off the assembly line a year and a half after building of the plant began. Machines on the line and their functions are described. Page 34.

★ Statistical Quality Control in Relation to Engineering

A valuable tool in the hands of engineering departments when used carefully, statistical quality control has not as yet been exploited to its full potentialities. The author discusses its techniques as related to tolerances. Page 38.

★ Ford's New Foundry Combines Automation and Comfort

Modernity in the fullest sense of the word keynotes the new Ford foundry in Cleveland, O. Analyzed in this article are the elements in plant layout and equipment which make for high worker productivity and comfort throughout. Page 42.

★ V-12 Tank Engine Production at Chrysler Plant

Humming with activity these days is the Michoud Ordnance Plant of Chrysler's Tank Div. Even though delivery on some machines is still pending, those in operation are running at a good clip. Here their functions are reviewed. Page 50.

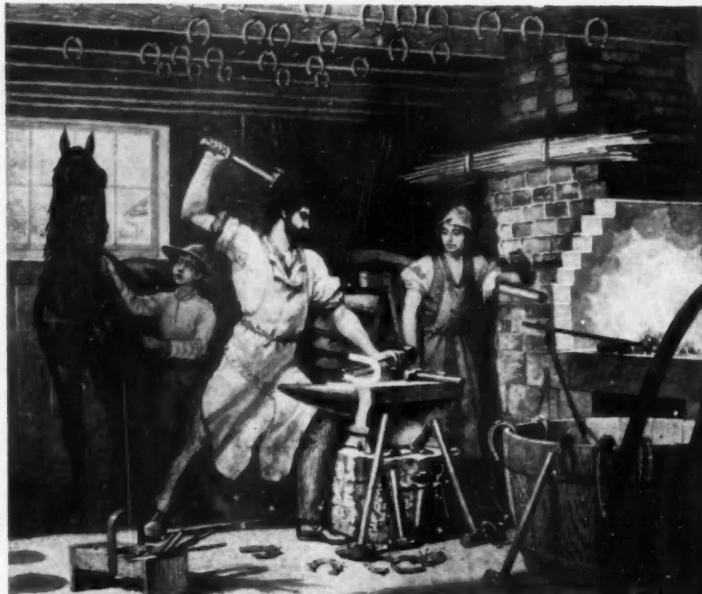
★ 24 New Product Items

And Other High Spots, Such As:

Transit brings out new low-cost buses; automatic controls insure emergency power where needed; pit type carburezizing furnaces provide flexible setup; International Harvester unifies engineering facilities; huge amphibious vehicle has one engine per wheel; and eighth annual meeting of the Magnesium Association.*

Automotive and Aviation News, Page 17
Complete Table of Contents, Page 3

AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES
• BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY •
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT
ENGINEERING • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
PRODUCTION • MANAGEMENT



From the Beale Collection of Early Americana

Horseshoe Iron...to Aircraft Steel

Ryerson Completes 110 Years of Service

When Joseph Ryerson opened his first small iron store, 110 years ago, the clang of the blacksmith's anvil was a dominant note in America's metalworking industry. Blacksmiths, boiler makers and other metalworking pioneers were the iron store's first customers. Their orders for horseshoe and boiler iron, axles, plow steel, spikes, etc. formed the basis of our business.

Today that small iron store has grown to be the world's largest steel service organization with fifteen great plants strategically located across the nation.

On the occasion of our 110th Anniversary, we are grateful for our thousands of customers whose orders through the years testify to the Ryerson tradition of trustworthy service. And we are thankful for the privilege of living and working in a free country where initiative and service are rewarded.

From your nearby Ryerson steel plant flows

every kind of steel in every shape and size to meet the needs of industry. Ryerson shipments cover everything from structural shapes and plates of carbon steel and bright sheets of stainless to high strength aircraft-quality alloys.

When you need steel, any kind, any quantity, cut to order and delivered promptly we will be pleased to have you call us.

PRINCIPAL PRODUCTS IN STOCK

CARBON STEEL BARS—Hot rolled and cold finished

STRUCTURALS—Channels, angles, beams, etc.

PLATES—Many types including Inland 4-Way Safety Plate

SHEETS—Hot and cold rolled, many types and coatings

TUBING—Seamless and welded, mechanical and boiler tubes

ALLOYS—Hot rolled, cold finished, heat treated. Tool steel.

STAINLESS—Allegheny bars, plates, sheets, tubes, etc.

REINFORCING STEEL—Bars and accessories, wire mesh, etc.

BABBIT METAL—Lead base.

RYERTEX—Plastic bearing.

MACHINERY & TOOLS—Metal fabrication

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 107, No. 12

December 15, 1952



MEET THE NEW FORD

A new grille and trim changes feature the 1953 Ford, offered in 12 single and 14 two-tone colors. Shock absorbers are recalibrated. Glass fibre lining is used under the hood, and 6.70 x 15 tires are standard on all models.

Hudson Prices Jet in Big Three Field

Hudson Motor Car Co. will call its new light car the Hudson Jet and will price it about on a level with Plymouth but higher than the Chevrolet and Ford-6. The Jet four-door sedan will carry a list price of \$1685 exclusive of federal and state taxes, preparation charges, transportation and local taxes, if any. A deluxe version to be called the Super Jet will be offered later at a list price of \$1775. Public introduction of the car is expected sometime in January. The jet carries the identical price as the lowest priced Plymouth 4-door sedan, the Cambridge, and the Ford V-8 custom line four door sedan. On a comparable basis, prices for the Chevrolet and Ford four-doors are as follows: Chevrolet Styleline, \$1519; Styleline deluxe, \$1603. Ford-6 Mainline, \$1530; Customline, \$1615; V-8 Mainline, \$1600; Plymouth Cranbrook, \$1772.

The Hudson Jet will be announced to the public sometime in January. The company has altered its model lineup somewhat by dropping the

Pacemaker name and including two models in the Wasp line—the Wasp at 112 hp and the Super Wasp at 127 hp. Production of the new car is just beginning and dealers will be sampled before it is announced to the public.

Others Hold Line

With the announcement by Lincoln-Mercury that all but one 1953 model Lincoln will carry the same prices as comparable 1952 models, the price trend for 1953 seems to be fairly well defined. The Capri 4-door sedan is the only model to carry an increase, \$93, to compensate for more luxurious trim. Lincoln also has announced that its optional equipment four-way power seat adjuster mechanism will be priced at \$65. Power steering and power brakes also are available at \$185 and \$40 respectively.

Truck prices apparently are to follow the same course as those on passenger cars, at least so far as Chrysler Corp. is concerned. Dodge Div. has announced that its new series trucks, introduced in December, carry retail price reductions ranging from \$31 to \$144.62.

Unions Ask Reopening of Wage Contracts

Although wages in the automotive industry declined one cent an hour under costs of living provisions in labor contracts, there appears to be some question about whether such adjustments will continue to be made without renegotiation of some contracts. Labor leaders have indicated that they will attempt to reopen contracts on the basis of a contemplated shift by the Bureau of Labor Statistics to a new formula for measuring the rise and fall in the cost of living. The new index will replace both the present revised national consumers' price index and the old series index published quarterly by BLS and which has been used as a basis for determining wages under cost-of-living contracts.

Labor leaders contend that use of the new index will require bargaining even under continuing agreements. That position, however, is challenged by most automobile companies who point out that specific contract language covers the contingency of a new index being used. Some observers feel that unions are seizing on the index change as an opening wedge in reopening contracts to press previous demands to fix a floor of 21 cents an hour under the present cost of living allowance, which currently stands at 25 cents an hour.

Rubber Use to Hit New Peak in 1953

Consumption of rubber next year will break all records and tire production will be the best in five years, according to E. J. Thomas, president of Goodyear Tire & Rubber Co. He estimates that the United States will use nearly 1.3 million long tons of rubber in 1953, with 58 per cent of the total to be synthetic.

News of the AUTOMOTIVE



THE NEW PONTIAC

First of the GM lines to be announced, the 1953 Pontiac has a new roomier body shell on a 122-in. wheelbase, with power steering optional. Front wheel camber and caster are changed and steering ratio is increased to 25 to 1. Six-cyl output is raised to 118 bhp at 3800 rpm (7.7 to 1 compression ratio with Hydramatic) with a dual carburetor, revised manifolding, longer valve opening, and aluminum pistons. Compression with standard transmission is now 7 to 1.

New Car Sales to Pass Four Million

New passenger car registrations this year will number slightly more than four million, according to estimates by R. L. Polk & Co. Latest figures put October registrations at just short of 400,000 units and November registrations, when complete, are expected to be considerably higher than for October. New truck registrations also are showing an increase but still are considerably behind a year ago. For the first three quarters of this year only 594,233 new trucks had been registered compared with 772,456 for the same period in 1951. New truck registrations for the year probably will total about 835,000 units.

Ford Net Worth Up to \$1.5 Billion

Assets of the Ford Motor Co. increased by \$115 million during 1951, to a total of more than \$1.584 billion according to the company's annual report filed with the Massachusetts State Tax Commissioner. Since all Ford stock is family owned, no report of earnings is required. In finance circles, however, it is estimated that Ford's earnings are second only to those of General Motors Corp. in the automobile industry. The

report shows an increase in plant value from \$458,865,000 to \$712,984,000. Current liabilities at the end of last year increased slightly more than \$11 million and reserves also increased to \$57 million from \$52.8. The net worth of the company today is about double what it was seven years ago when Henry Ford II became president.

English Seek Mikes On Large Vehicles

Motoring groups in England are reported to be pressing for compulsory installation of small microphones at the rear of large trucks and buses. Reason is that they complain drivers of the big vehicles cannot hear the horns of passenger vehicles to the rear which want to pass. They say the microphones would carry the horn signal to the driver in the cab of the truck.

Conserving Diamonds

Carboloy Div. of General Electric Co. disclosed it is working on new methods for machining and grinding carbides. Electrical power is used in undisclosed ways to cut down on the wear of diamonds. Conservation was indicated as the prime purpose behind the testing program, which has the support of the Department of Commerce and NPA.

Demand Returns Crank to Window Vent Panes

The reason behind Pontiac's return to crank-operated ventilator windows in its 1953 models demonstrates the importance of customer preference to automobile manufacturers. Pontiac abandoned the crank in favor of friction type vent panes on 1949 models as a cost factor. However, the company was still getting letters from its customers four years later asking for the crank-operated ventilators so the company is going back to them even at some cost penalty.

Meyers Made Chairman of Clevite Corp.

James L. Meyers, president of Clevite Corp., the new parent of Cleveland Graphite Bronze Co., has been named chairman of the board in addition. He succeeds Ben F. Hopkins, who has been named honorary chairman. The corporate name was changed to Clevite Corp. effective Nov. 20.

Ford Markets Special Tools for Service

Ford Motor Co. now is designing and marketing all of its own special tools required in service work. The tools are designed by Ford engineers and specifications are turned over to the purchasing department which contracts for their manufacture by vendors. The tools then are sold through the dealer organization. The company says one principal advantage is that the tools are available at the time of new model introductions.

APMA Elects Five New Directors

Automotive Parts Manufacturers Association has elected five new directors for three year terms beginning Jan. 1. They are M. F. Cotes, president of Motor Wheel Corp.; E. E. Lundberg, president of Briggs Manufacturing Co.; John Dixon, executive vice-president of Clevite Corp.; Goodloe Rogers, president of American Forging and Socket Co. and John Dopke, administrator of the automotive division of A. O. Smith Corp.

AND AVIATION INDUSTRIES

AAA Reveals Annual Car Upkeep Cost

The AAA has come up with some interesting figures showing the average yearly cost for car maintenance and repair in 1951 for its members. Total cost that year was \$287.12 with \$105.50 going for engine and chassis repairs. There was wide variation in this item, however, ranging from as low as \$50 to more than \$200 in major overhaul cases. Average expenditure for general maintenance, such as replacement of such items as ignition points, fan belts, lights, windshield wipers, spark plugs, and brake and wheel repairs, and car washing and lubrication stood at \$181.62 according to AAA.

UAW-CIO Negotiates Tank Arsenal Pact

Chrysler Corp. has negotiated a contract with the UAW-CIO covering approximately 3000 workers at the Detroit Tank Arsenal. The union won representation rights for the workers in an NLRB election held when the Government turned the operation over to Chrysler. Workers previously had been represented by an AFL union when the plant was operated by the Government. The contract runs until August of 1955 and contains the escalator cost-of-living provision and the 4-cent annual improvement factor similar to contracts in the automotive industry. It also provides pensions calling for a maximum of \$135 monthly paid solely by the company, and group life, sickness, and accident and hospitalization insurance with Chrysler paying half the cost. Wage increases and automatic progression to top rates in 90 days also are included in the agreement.

Willys Will Sponsor Inauguration on TV

Sponsorship of radio and television coverage of the Presidential inauguration Jan. 20 will be practically a 100 per cent automotive affair. Willys-Overland Motors, Inc., will sponsor the ABC coverage of the event, which will include President-elect Eisenhower's visit to President Truman at the White House, the parade to the

MERCURY

Mercury for 1953 offers new exterior styling in 13 colors and 30 two-tone combinations. Engineering changes include a new air cleaner and an improved exhaust system with a larger diameter tail pipe.



Capitol, the inauguration ceremony, and the inauguration parade. Previously General Motors and Packard had announced commitments to sponsor the event over the other two major networks.

Dealers Ask Top Contact

J. Saxton Lloyd, president of NADA, has proposed that all automobile manufacturers set up a top echelon dealer relations department. He says now dealers have to do all of their business with personnel who are under constant sales compulsion, and he calls it a great mistake.

Plans for Canadian Ford Addition Announced

Limited production is expected to start next May on a pilot assembly line in the new plant of the Ford

Motor Co. of Canada Ltd. at Oakville, Ont. Now under construction, the 32½-acre plant will be the largest industrial building under one roof in Canada.

Passenger car operations will be moved from Windsor to Oakville over a two or three month period next summer, but the truck line will not be moved until well into 1954, according to a company spokesman.

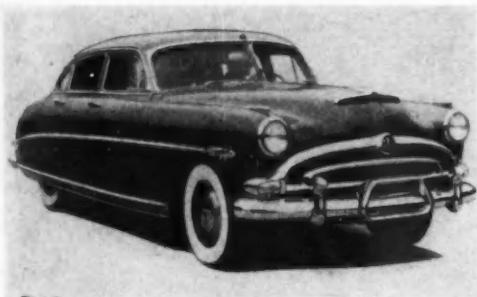
As passenger car operations are moved out of the existing assembly building at Windsor, it will be transformed into what is described as the largest and best equipped engine plant in the Canadian automobile industry. About \$19 million will be spent for equipment and another \$5 million to re-equip the company foundry in Windsor, increasing its capacity by 50 per cent.

BLADE CHECK

Nine Sheffield air gages are used to test J-47 turbojet blades at Packard Motor Car Co. Blades are checked at top, center, and bottom for centrality, warp angle, bow thickness, lean and tilt all at once on the 18-column unit.



News of the AUTOMOTIVE



Three New Furnaces Installed at Kropp

Kropp Forge Co. has completed the installation of three new heat-treating furnaces capable of more than doubling its production. The new furnaces, which are completely automatic and the most modern of their kind, have a rated capacity of over 4000 lb of steel per hour as compared to about 2000 lb per hour for the old-type furnaces. They contain automatic cooling equipment making it possible to test forgings as soon as they are removed from the furnace. Previously, it was said, forgings had to be air-cooled for eight hours. The new units also contain automatic devices facilitating the removal of forgings from the furnaces.

New Group on Metal Cleaning

The formation of a task group concerned with metal cleaning processes for the automotive industry was an-

nounced by J. C. Harris, chairman of ASTM committee D-12, on soaps and other detergents. This committee, formed in 1938, is one of the main technical committees making up the American Society for Testing Materials.

The function of this new task group, chairwoman by H. A. Kafarski of Ford Motor Co., will be the development of recommendations of industry-wide standards for cleaning methods.

Willys Announces New Four-Door Sedan

With the announcement of its 1953 line of passenger cars, Willys-Overland Motors, Inc., unveiled a four-door Aero sedan and a deluxe hardtop model, the Eagle, with one-piece windshield. Both two- and four-door sedans are priced lower than 1952 two-door models in the respective Ace and Lark lines. A new Falcon line was introduced at the same time.

HORNET RESTYLED

The 1953 Hudson Hornet and Super Wasp feature a simulated aircoop motif. Two smaller engines now have optional 7.2 to 1 aluminum heads.

Ryan Books \$6 Million In New Orders

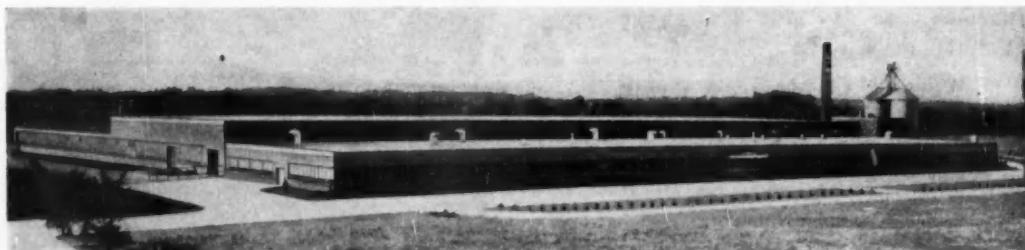
Ryan Aeronautical Co. announced the closing of \$6 million in new orders for jet engine components, exhaust systems and airframe parts last month.

Contracts from General Electric Co. for parts for the J-47 jet engine totaled in excess of \$2 million for the period, while Douglas Aircraft Co. and the Ford Motor Co. placed new orders of more than \$1 million each, with smaller but substantial new business also coming from Continental Motors Corp., Fairchild Aircraft Co., Boeing Airplane Co. and other customers. A second contract in research and development of titanium was awarded to Ryan. The Navy ordered the manufacture and test of examples of airframe construction.

Air Pioneer Retires

John K. Northrop, president of Northrop Aircraft, Inc., announced his retirement from the aeronautical field. The internationally-famous engineer and designer ended his 36-year career in aviation due to the progressive impairment of his health. He stated that he has no plans beyond the extended vacation necessary to regain his health.

The Northrop board of directors accepted Mr. Northrop's resignation "with the deepest regret," and elected board chairman Oliver P. Echols to serve also as president. Fulfilling Northrop's engineering duties will be Edgar Schmued, who was appointed vice president in charge of engineering for the company.



ATWOOD OPENS NEW PLANT

The new Rockford, Ill., plant of the Atwood Vacuum Machine Co. was opened last month. With a floor area of 7½ acres, the plant adds materially to the firm's capacity to furnish stampings to the automotive industries, a large segment of which they now serve.

AND AVIATION INDUSTRIES

Hydraulic Production Vickers Expands

Manufacturing facilities of Vickers, Inc., have been expanded with the addition of a plant at Joplin, Mo., having over 100,000 sq ft of floor space. The new plant, which began production of aircraft components about Aug. 1, provides greatly increased manufacturing facilities for Vickers' extensive line of hydraulic pumps, motors, accumulators and power transmissions supplied to the aviation industry. Manufacture of aircraft hydraulics for both military and commercial use will also continue at Vickers' plant in Detroit.

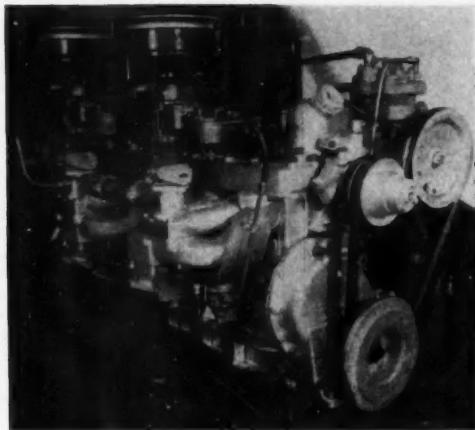
The Joplin site was selected in an effort to comply with the decentralization policy prescribed by the military services for suppliers of proprietary equipment. The plant's geographic location also brings it closer to Vickers' airframe customers on the west coast and in the midcontinent.

History of Helicopter Told by Shell Movie

"The History of the Helicopter," a 16-mm sound motion picture which tells the story of the development of rotating-wing aircraft, from the visionary drawings of Leonardo da Vinci to the troop-carrying giants of today, has been completed and is now available for free distribution, Shell Oil Co. announced.

DODGE HEAVY

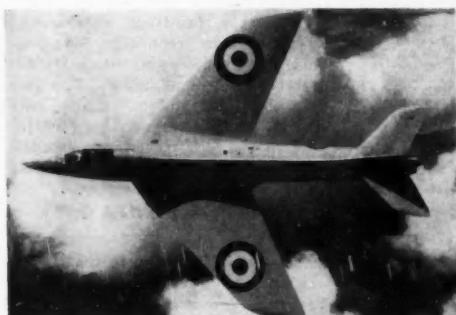
Seven engines, three completely new, power the new B-4 series of Dodge Trucks. Largest is 413.16 cu. in. model of 171 gross hp at 3200 rpm. The M-3 semi-automatic transmission is offered on $\frac{1}{2}$ and $\frac{3}{4}$ ton models.



Combining historic footage and shots from private film collections with new material, the 25-minute picture recounts how Breguet, Sikorsky, Berliner and others carried out pioneer experiments in the early years of this century. Although overshadowed by the Wrights and others who developed fixed-wing planes, they persisted until they perfected the helicopter in its present forms. It is available free upon request to Shell Film Library, 50 West 50th St., New York 20, N. Y., or 100 Bush St., San Francisco, Calif.

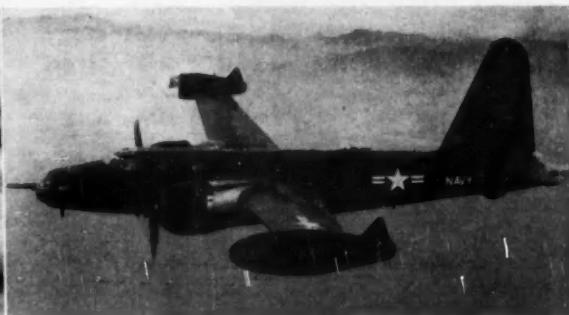
Norge to Make F-84F Parts

The aircraft department of Norge Div. of the Borg-Warner Corp. has been awarded a contract by General Motors Corp. for the manufacture of parts for the F-84F Republic Thunderbolt plane. Production of sub-assemblies for the jet plane will begin immediately at the company's Muskegon, Mich., plant. Norge is already delivering sub-assemblies for jet fighter bombers and will soon be delivering parts for the B-47 jet bomber on previously awarded contracts.



HAWKER HUNTER

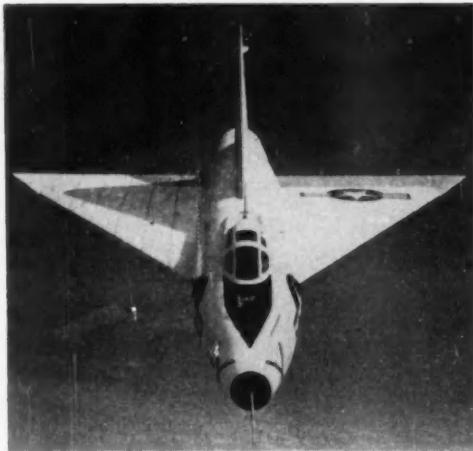
Just released from security classification is this plan view of the British Hawker Hunter supersonic interceptor fighter, said to be the only single engined British fighter to travel faster than sound. It is powered with the Rolls Royce Avon turbojet engine.



LOCKHEED NEPTUNE

The Lockheed P2V-6 Neptune is designed for mine laying and anti-submarine warfare. This model has a longer nose, smaller wingtip tanks and radome than previous models. Nacelles for the Wright turbocompound engines are of stainless steel.

News of the AUTOMOTIVE



Northrop to Modify F-89

Cost of wing modifications on Northrop F-89 fighter-bombers will be \$15 million or less, the Air Force estimates. Changes will consist primarily of replacing the extruded wing-tip attaching fitting with heavier machined fittings and installing horizontal pins for the wing-tip tanks. Initially, it was believed these and

other modifications would cost about \$17 million, but revised estimates brought this figure down by \$2 million. Though the all-weather planes are temporarily grounded for the change-over operation, the Air Force says they are ready for combat and would be used if required. The F-89s will be modified at Northrop's Ontario and Hawthorne, Calif., plants.

FIRST DELTA

The Convair XF-82A, pioneer delta-wing aircraft of four years ago, is completing tests for the Air Force and will be turned over to the NACA for theoretical investigations of high speed air flow theories. It is forerunner of the supersonic F-102 interceptor ordered into production recently.

Ford, ALCOA, Thompson Announce New Facilities

Ford Motor Co. will begin work immediately on a new parts and sales office building at Teterboro, N. J., on a 27-acre site. The 370,000 sq ft of floor space will serve to employ over 500 workers.

Aluminum Co. of America has announced plans to build a modern fabricating plant in the Lancaster, Pa., area for production of aluminum screw machine products, fasteners, rivets and nails. Cost will be in excess of \$3 million. The operations to be relocated in Lancaster from Edgewater, N. J., will make room for a planned expansion of Edgewater sheet, impact extrusion and foil production facilities.

Thompson Products, Inc., announced it has leased 39,000 sq ft of floor space in Cleveland, O., for Roto-cap and valve die production. At the main plant the forge shop will be rearranged and three presses will be added to the automotive valve production line.

Reo Hot Sprays

Hot spray painting, a technique that has been gathering momentum for several years, has been adopted by Reo Motors, Inc., for all painting operations, according to a recent announcement. The company has invested over \$50,000 in new equipment for this purpose.

Sheet metal is processed through a degreaser, a five-stage washer, and drying oven in preparation for painting. In the hot spray process paint is heated to around 160 F. Reo uses a primer coat and two finish coats and will offer some vivid colors including red, green, orange, in addition to the usual gray and prime.

Ford Presents UJA Gift

A \$25,000 check, 1952 contribution of the Ford Motor Co. to the United Jewish Appeal of Greater New York, has been presented to the national UJA chairman. Presentation was made by Allen W. Merrell, assistant to the president of the Ford Motor Co. The donation was obtained through UJA's new car dealers division.

1952 U. S. PASSENGER CAR PRODUCTION

(As reported by the car factories)

| | November 1952 | October 1952 | November 1951 | 1952 | 1951 |
|-----------------------------|------------------|-----------------|------------------|------------------|------------------|
| | | | | | |
| Chrysler | 10,655 | 11,210 | 12,263 | 102,050 | 155,900 |
| De Soto | 10,849 | 11,705 | 9,527 | 84,651 | 114,175 |
| Dodge | 27,893 | 21,574 | 22,303 | 221,784 | 304,852 |
| Plymouth | 46,457 | 30,565 | 40,190 | 409,921 | 589,949 |
| Total—Chrysler Group | 95,374 | 69,854 | 84,263 | 819,206 | 1,164,876 |
| Ford | 65,234 | 103,924 | 64,296 | 685,337 | 854,327 |
| Lincoln | 2,180 | 1,732 | 28 | 26,981 | 24,528 |
| Mercury | 22,381 | 23,042 | 22,324 | 172,141 | 231,066 |
| Total—Ford Group | 99,795 | 128,996 | 86,648 | 886,539 | 1,109,953 |
| Buick | 28,518 | 35,642 | 27,549 | 301,268 | 383,734 |
| Cadillac | 6,024 | 10,886 | 7,574 | 90,716 | 99,188 |
| Chevrolet | 90,308 | 114,134 | 75,865 | 831,011 | 1,053,222 |
| Oldsmobile | 19,425 | 26,906 | 19,823 | 213,347 | 271,497 |
| Pontiac | 14,677 | 32,844 | 23,435 | 246,810 | 324,194 |
| Total—G. M. Group | 169,147 | 220,184 | 154,076 | 1,686,330 | 2,120,863 |
| Kaiser-Frazer Group | 7,312 | 8,612 | 4,878 | 66,778 | 98,851 |
| Hudson | 5,121 | 3,710 | 769 | 69,800 | 88,000 |
| Nash | 16,884 | 18,875 | 9,847 | 137,807 | 151,939 |
| Packard | 5,129 | 4,393 | 7,031 | 53,742 | 71,734 |
| Studebaker | 20,254 | 21,132 | 10,085 | 152,422 | 208,020 |
| Willys | 4,798 | 6,408 | 2,176 | 49,337 | 26,952 |
| Total—All Makes | 483,814 | 480,964 | 359,813 | 3,920,753 | 5,049,188 |

AND AVIATION INDUSTRIES

Fram Announces Formation of Canadian Subsidiary

Fram Corp., Providence, R. I., has announced the formation of a new Canadian subsidiary company, Fram Canada Ltd. Fram plans to establish headquarter offices and a factory in Stratford, Ont.

Ground for the new office and factory building will be broken immediately, and it is expected that the modern 24,000 sq ft building will be completed late next spring. The J. C. Adams Co., Ltd., of Toronto, Ont., will continue as exclusive sales representatives of the new Fram company.

Several Defense Contracts Have Been Announced

Over \$23 million worth of engine parts have been ordered from Pratt & Whitney Div. of United Aircraft Corp. by the Air Force. From the Cleveland, O., ordnance district the Erie Div. of Detroit Steel Products Co. recently received an order for more than \$3 million worth of anti-tank mines.

The Hall-Scott Motor Div. of ACF-Brill Motors Co. has received a contract totaling about \$2 million from

Army Ordnance for the manufacture of ammunition. Production of this ammunition will require approximately \$750,000 worth of new metalworking equipment, and a new plant is being constructed in Richmond, Calif., to house this new equipment. It is expected that the plant will be completed about the middle of December. Being built on a two-acre plot, the plant will have about 40,000 sq ft of productive capacity.

The Stanley Aviation Corp. of Buffalo, N. Y., announced it has received an order that will run between \$500,000 and \$1 million to supply pilot-ejection seats for all the Navy FJ-2 and FJ-3 planes being built by North American Aviation in Columbus, O.

Heavy Forge Presses Draw Crowds at 73rd ASME Meeting

The large forging press technical meetings, held in conjunction with the American Society of Mechanical Engineers' 73rd Annual Meeting in New York City this month, proved so popular that the meeting room was filled to overflowing. Papers dealt with all of the principal elements involved in the problems of the creation and the utilization of the huge presses for

light metals. Use of the mammoth presses will reportedly revolutionize some aspects of aircraft design and manufacturing, and reduce the cost of military planes.

Under Secretary of the Air Force Roswell L. Gilpatric, speaking before the forging press dinner meeting, mentioned that the main drive behind the authorization by Congress of the heavy forging press program, came from the Air Force.

The election of Frederick S. Blackall, Jr., president and treasurer of the Taft-Pierce Manufacturing Co., as president of the society for 1953, was announced. The new president succeeds Reginald J. S. Pigott, chief engineer of the Gulf Research and Development Co.

Sir Geoffrey de Havilland, world-famous aircraft designer, was presented in absentia with the Daniel Guggenheim medal at the annual banquet of the ASME on Dec. 3. He was one of the eleven persons honored at this event.

(Turn to page 141, please)

New NBP President



Joseph S. Hildreth

Joseph S. Hildreth, president of the Chilton Co., Inc., was elected president of National Business Publications, Inc., at its annual meeting in November at New York City. NBP is the largest organization of business magazine publishers, and AUTOMOTIVE INDUSTRIES has been affiliated with it for a number of years along with all other Chilton magazines.

1952 MOTOR VEHICLE FACTORY SALES*

| | Passenger Cars | Trucks | Buses | Totals | |
|------------------|----------------|---------|-------|-----------|-----------|
| | | | | 1952 | 1951 |
| January | 273,122 | 101,510 | 778 | 378,410 | 606,833 |
| February | 333,224 | 106,367 | 865 | 449,216 | 616,221 |
| March | 372,440 | 108,964 | 869 | 482,973 | 756,022 |
| April | 415,357 | 113,631 | 887 | 529,866 | 639,272 |
| May | 397,486 | 106,006 | 423 | 503,917 | 652,727 |
| June | 407,982 | 110,264 | 484 | 518,710 | 617,885 |
| July | 188,327 | 43,231 | 224 | 211,782 | 482,316 |
| August | 210,577 | 82,056 | 349 | 270,982 | 548,707 |
| September | 430,397 | 112,370 | 387 | 551,159 | 478,002 |
| October | 471,906 | 132,064 | 389 | 604,261 | 526,448 |
| Total—Ten Months | 3,496,700 | 982,470 | 4,825 | 4,483,995 | 5,934,340 |

1952 MOTOR TRUCK FACTORY SALES BY G.V.W.*

| January | 5,000 lbs. and less | 10,001-14,000 | 14,001-19,000 | 19,001-24,000 | 24,001-28,000 | Over 28,000 | Total | |
|--------------|---------------------|---------------|---------------|---------------|---------------|-------------|--------|-----------|
| | | | | | | | 1952 | 1951 |
| January | 35,116 | 17,032 | 5,914 | 22,496 | 8,368 | 9,178 | 4,234 | 101,510 |
| February | 35,116 | 18,114 | 6,251 | 23,276 | 7,149 | 9,132 | 4,327 | 101,367 |
| March | 38,512 | 19,482 | 5,857 | 24,347 | 5,092 | 10,075 | 5,028 | 106,964 |
| April | 44,191 | 22,313 | 6,576 | 21,989 | 4,804 | 10,062 | 4,838 | 113,631 |
| May | 40,398 | 22,934 | 5,578 | 19,243 | 4,326 | 10,033 | 3,434 | 106,004 |
| June | 41,250 | 23,455 | 5,373 | 19,994 | 4,242 | 8,984 | 3,810 | 110,264 |
| July | 15,860 | 8,559 | 2,057 | 11,010 | 1,602 | 3,989 | 2,211 | 22,071 |
| August | 22,761 | 9,363 | 2,057 | 7,622 | 1,352 | 6,177 | 2,754 | 82,056 |
| September | 51,787 | 22,305 | 3,684 | 17,846 | 3,416 | 8,735 | 3,422 | 112,370 |
| October | 62,480 | 26,374 | 5,305 | 21,205 | 3,437 | 9,544 | 3,719 | 132,064 |
| Total—10 Mo. | 391,880 | 190,972 | 47,866 | 184,813 | 40,098 | 37,960 | 30,863 | 982,470 |
| Total—10 Mo. | 320,442 | 226,061 | 58,285 | 238,523 | 60,298 | 58,041 | 38,482 | 1,238,922 |

*Automobile Manufacturers Association.

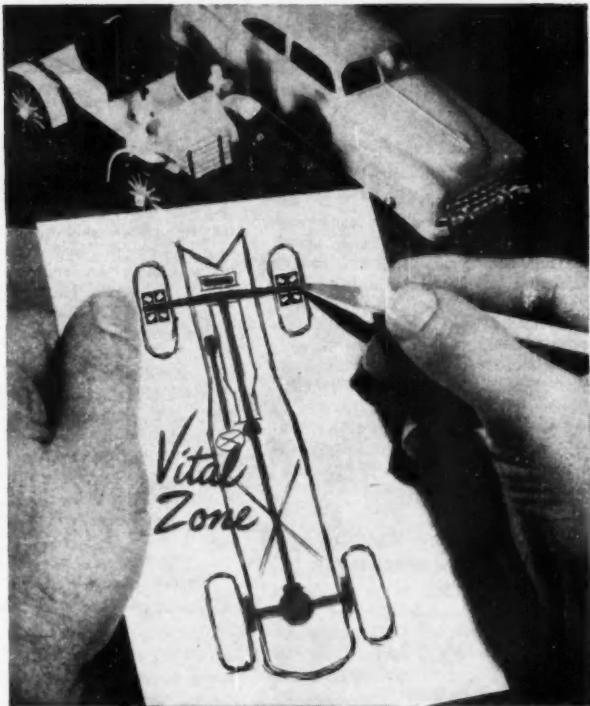
What one appeal sold both?

CAR styles come and go as public tastes change. But the one thing that doesn't change is the great American habit of shopping for *value*. Car buyers looked for it in 1906—they're looking for it in 1952.

Value always has been and always will be the appeal that sells them and sells them again—especially the value that counts most, in the "vital zone", the moving parts of the car. One way for you to be sure of value in the "vital zone" is to remember this simple formula when buying component parts for the cars you build.

$$\text{Value} = \frac{\text{quality} + \text{service} + \text{public acceptance}}{\text{price}}$$

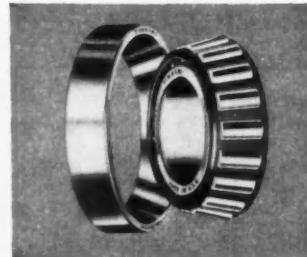
It shows that price is only one factor in value, and must be weighed in relation to the factors *above* the line. Timken® bearings give you far more above the line than any other tapered roller bearing. That's because of their higher quality, better service and greater public acceptance. And in terms of value features, Timken bearing prices are lower today than ever. The Timken Roller Bearing Company, Canton 6, Ohio.



How TIMKEN® bearings give you value where it counts most . . . in the "vital zone":



IMPRESSIONS BY THE MILLIONS. Here are a few of the magazines which will help the advertising program of the Timken Company make an estimated 688,000,000 reader impressions this year. It's one big reason for the tremendous public acceptance of Timken bearings.



PINION STANDARD. Timken bearings are standard on pinions—toughest bearing application in the car—in all but two makes of cars. It's proof of the preference for Timken bearings where value counts the most—in pinions, wheels, differentials, steering gears—the "vital zone" of the car.

it's **TIMKEN** for **VALUE**

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TAPERED ROLLER BEARINGS

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

ONLY TIMKEN BEARINGS
GIVE YOU
ALL THESE VALUE FEATURES

QUALITY

1. Design leadership
2. Steel made in our own mill
3. Precision manufacture
4. Rigid quality control
5. More than 50 years' experience

SERVICE

6. Unequalled engineering service
7. Unequalled research and development facilities for your use
8. Installation service in the field
9. Widest range of sizes
10. Most dependable source of supply

PUBLIC ACCEPTANCE

11. First choice throughout industry
12. Best-known name in bearings
13. Widespread advertising

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers



Firestone Steel Products Co.—Appointment of George B. Moseley as general sales manager was recently announced.



Allis-Chalmers Mfg. Co.—W. Voegeli fills the newly-created position of assistant director of engineering.



Shakeproof Div. of Ill. Tool Works—John F. Newhard is now production control manager.

Caterpillar Tractor Co.—Jack H. Gill has been appointed assistant manager of the industrial division in the general sales department.

Bendix Aviation Corp.—A. P. Fontaine has joined the firm as a staff assistant.

Westinghouse Air Brake Co.—W. F. Huggins was named assistant to the president, assigned to European companies. He continues as president of Le Roi International and Le Roi Pan American.

United States Steel Corp.—Clifford F. Hood was elected president and a member of the board, succeeding Benjamin F. Fairless, who remains board chairman. Robert C. Tyson was elected vice chairman of the finance committee and a board member. Harvey B. Jordan was elected executive vice-president—operations, Howard E. Isham, vice-president and treasurer, and Walter F. Mumford, president of the American Steel & Wire Div.

Chrysler Corp.—Carl F. Lucksinger was appointed a staff assistant to the director of industrial relations.

Kaiser-Frazer Corp.—Richard B. Fialho has been named manager of the aircraft scheduling and estimating department. J. W. Roche was appointed assistant general superintendent of the flight test department.

George W. Walker, Inc.—Frank A. Bianchi has joined the creative staff.

F. B. Hubert Agency—Bill Taylor, former Cleveland editor of *Iron Age*, has joined the firm of advertising counselors.



Magnesium Association—James S. Kirkpatrick, director of research and development for Brooks & Perkins, Inc., was elected president.



Clevite Corp.—William W. Brown was appointed assistant to the president. William G. Laffer has been named president of the Cleveland Graphite Bronze Co. division and Edwin Crankshaw was named chief engineer of the division. Crankshaw replaces Henry W. Luetkemeyer, who moves to the parent Clevite Corp. on the new products staff. Other Cleveland executives are: L. W. Christensen, vice-president—sales; Merrill A. Young, vice-president—personnel; Fred P. Salzman, works manager; and William H. Hagy, controller.

Mansfield Tire & Rubber Co.—Recently promoted were M. L. Bayer to factory manager, and H. P. Partenheimer to director of research and development.

Minnesota Mining & Mfg. Co.—Robert W. McElroy is appointed to the new position of director of safety.

Pressed Steel Car Co.—Thomas A. Morgan was elected a director. He recently retired as president and chairman of the Sperry Corp.

Ford of Canada—D. A. Lambert is general superintendent and K. O. Grant is purchasing agent of the assembly plant under construction at Oakville, Ont.

B-O-P Assembly Div. of General Motors Corp.—H. F. Settle is now production manager of the F-84F program at Kansas City, Kans. He is succeeded as production manager of the Wilmington, Del., plant by K. N. Scott. J. J. Edwards succeeds Scott as divisional director of work standards. S. M. Read is named production manager of automotive assembly at Kansas City, Kans., succeeding R. J. Howlett, who is now production manager of the Arlington, Tex., plant.

Twin Coach Co.—Appointment of A. F. Siers as director of motor truck engineering was announced recently.

Shakeproof Div. of Illinois Tool Works—William P. Bulger has been named market research manager.

Oilgear Co.—Wilbert G. Prasse was elected president to succeed the late George H. Fobian. Frank G. Kuhausen was elected vice-president and director.

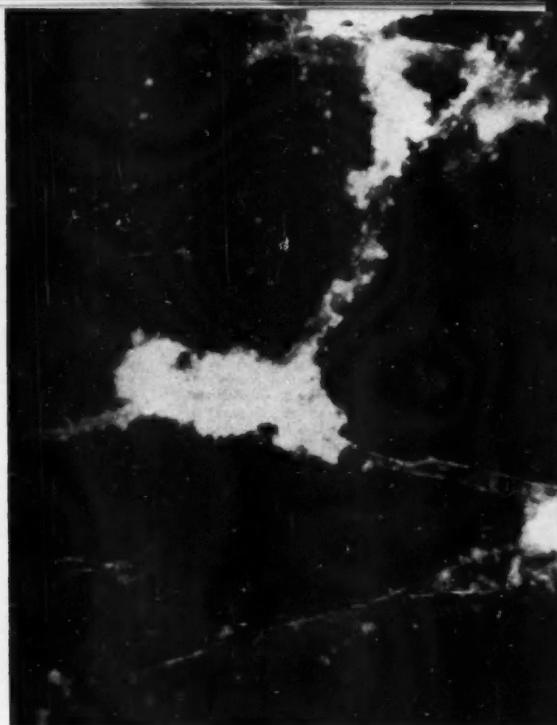
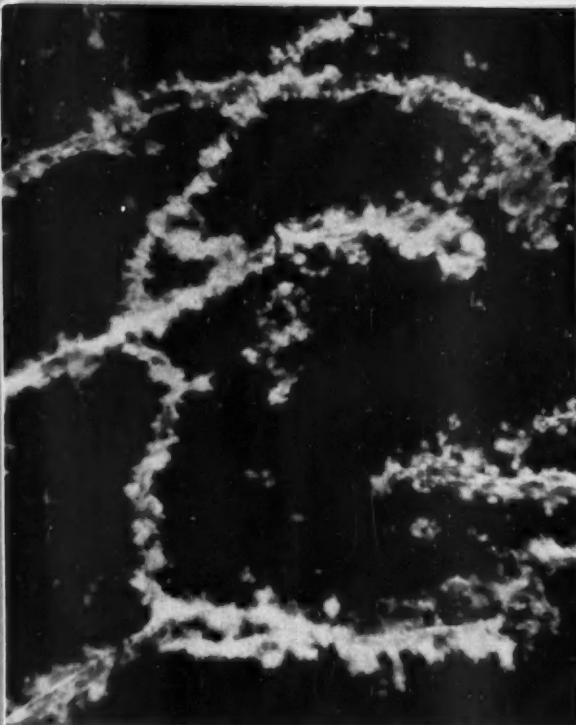
(Turn to page 159, please)

Necrology

Paul Gaeth, 79, who built an automobile in 1898 and headed the Gaeth Motor Car Co. from 1902-1912, died Nov. 24 at his home in Cleveland, O.

Dr. G. V. Lomonosoff, 76, builder of the first Diesel-electric locomotive, died at Montreal, Can., on Nov. 19.

Carl F. Unruh, 60, director of purchases for Ford Motor Co., died at his home in Farmington, Mich., on Dec. 4.



Which of these saturation methods gives a tighter sealing gasket?

● Each photomicrograph is of fibers coated by a beater saturation method. Yet one shows fibers that will become a gasket sheet of amazingly greater sealing efficiency.

Fibers locked in rubber. The picture at the left shows how Accopac® fibers are coated evenly with a latex saturant. This is a result of Armstrong's patented beater saturation method. Each fiber is locked in a uniform coat of saturant.

The picture at the right shows what can happen without proper beater saturation controls. The saturant is distributed in uneven lumps. This uneven distribution means the gasket will be porous and likely to leak.

The greater uniformity and impermeability of Accopac's structure are the key to its remarkable sealing efficiency.

More rubber on the fibers. The new saturation process can deposit satura-

tion up to 100% of the weight of the fibers, compared with the usual 20-25%. This controlled saturation gives a wide variety of possible qualities to choose from.

Never shrinks or dries out. Accopac can be stored for months with almost no change in dimensions or performance. First, because the saturant covers the fibers so completely that humidity changes cause no significant dimensional changes. Second, because the saturant is a latex rather than a glue-glycerine. Neither heat nor age can leach out this latex binder and cause leaks.

Cork adds high compressibility. Thousands of finely ground cork particles enable Accopac to seal equally well on light or heavy flanges. They give it both high compressibility and amazing crush resistance.

Users report: "No Leaks." These quotes are taken from scores of enthusiastic user reports on Accopac's performance.

"Completely eliminated oil seepage"—tractor pan gasket.

"Eliminated leaks common with old plant fiber gaskets"—water pumps.

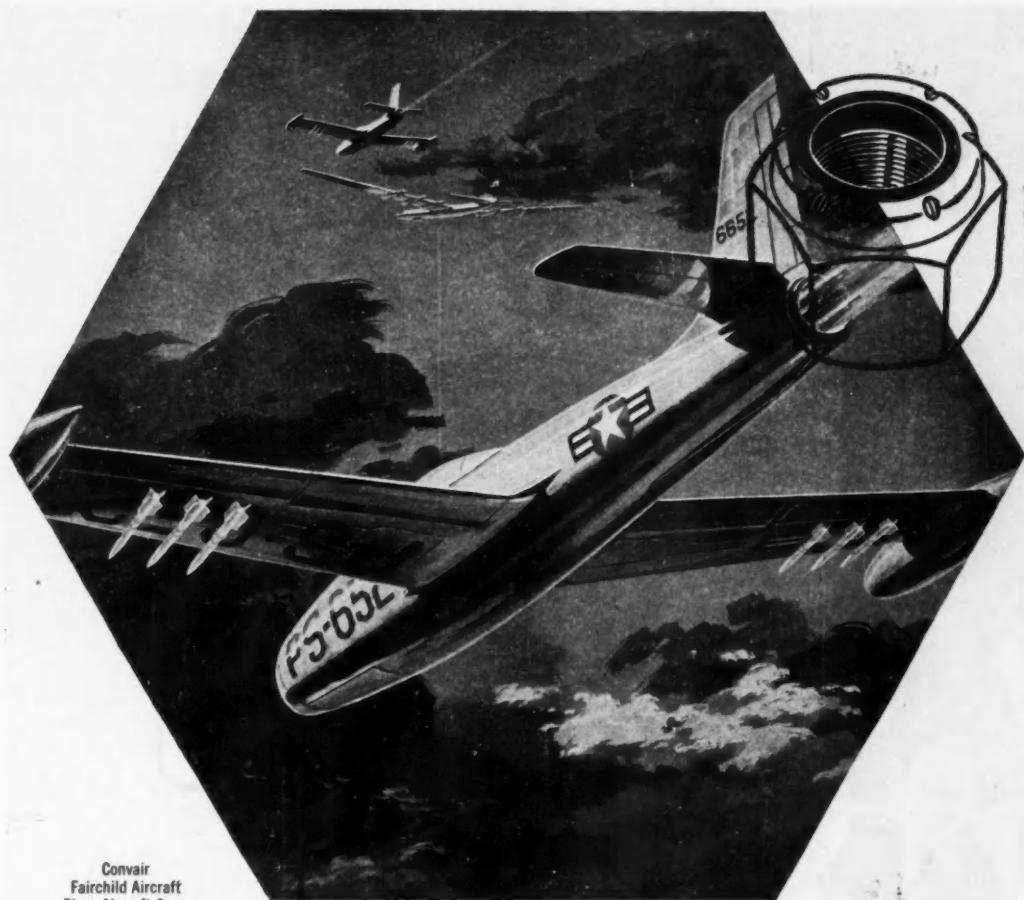
"Accopac is the only material giving 100% assurance of no leaks"—gear case gasket.

"100% assurance of no leaks"—oil valve.

Get samples for testing. Accopac materials come in sheets, rolls, ribbons, or die-cut shapes. Test Accopac against your present gasket material. We'll be glad to supply samples without cost or obligation. Just call your Armstrong representative or write Armstrong Cork Company, 5812 Arch Street, Lancaster, Penna.



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KENMORE
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CORRY
PENNSYLVANIA
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Milwaukee
BROADWAY
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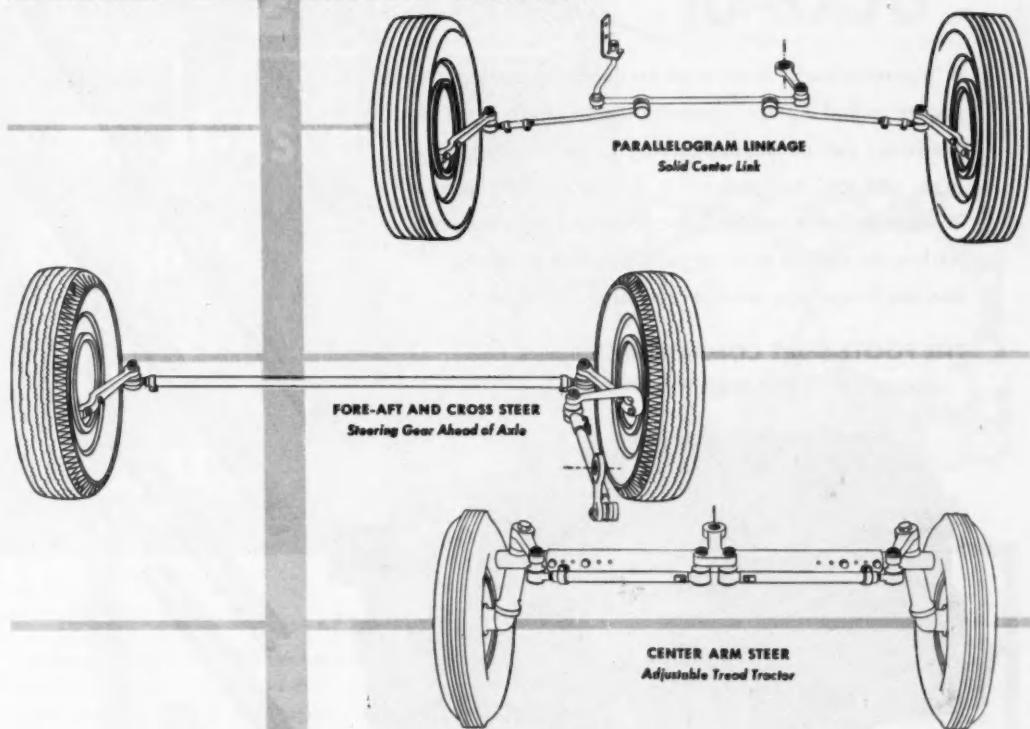
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| F. H. MANROSS AND SONS CO. BRISTOL, CONNECTICUT | OHIO DIVISION 175 EAST FIRST ST. DAYTON, OHIO | DUNBAR BROTHERS COMPANY BRISTOL, CONN. | MILWAUKEE DIVISION 341 E. ERIE ST. MILWAUKEE, WIS. | THE WALLACE BARNES COMPANY LTD. HAMILTON, ONT. CANADA |

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DIVISIONS OF ASSOCIATED SPRING CORPORATION AND CANADIAN AFFILIATE

Engineered Steering for All Wheeled Vehicles



STEERING LINKAGE must be developed to meet the problems peculiar to many sets of design conditions. For over 50 years Thompson's "Steering Engineers" have worked closely with manufacturers of all types of wheeled vehicles to develop and produce the best steering linkage for any type vehicle.

Illustrated here are typical examples of steering linkage produced by Thompson for passenger cars, for trucks and buses and for tractors.

Whether your problem is improved steering for a car, a truck or a tractor, the Detroit Division of Thompson Products has, or can engineer and produce, the steering linkage best adapted to the vehicle you produce. We welcome the opportunity to work with your engineers on any of your steering problems. Please contact us.

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COST REDUCTION thru faster, continuous broaching of multiple parts

• Wherever metal is removed on duplicate small parts you are apt to find a place where Footburt Surface Broaching Machines can cut manufacturing costs. Production is high, and tool maintenance is low in cost per piece. We have had many years of experience in designing the tooling for various types of parts and will gladly advise you in applying surface broaching to your work.

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• Holding fixtures
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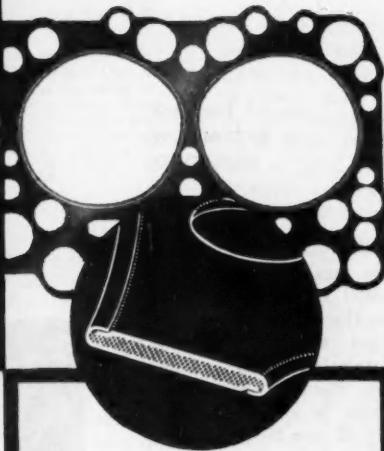
VIC-2-FOLD

U.S. REG. TRADE MARK

Metal-Asbestos Cylinder Head Gaskets



to .030



25% Thinner — No Loss of Sealing Efficiency

Now available in reduced thickness from their former .040 compressibility limit, VIC-2-FOLD gaskets meet your specifications for highest compression ratio engine design.

Compressible to .030, this thinner gasket retains all features of VIC-2-FOLD construction as described at right. Similarly it retains all recognized superior sealing characteristics of metal-asbestos gasket structures.

Perfect Replacement for Beaded Steel

Designers will find this new VIC-2-FOLD ideal for replacement or specification change on engines where heretofore only thin beaded steel gaskets were available. Get complete details from your Victor Field Engineer or by direct inquiry.

The Only Positive Sealing Gasket for Modern H.C. Engines

VIC-2-FOLD is the only thin gasket compressible to .030, combining the recognized advantages of copper-steel-asbestos construction.

Note how the high strength of steel is utilized in bottom layer. Combustion openings are turned up, overlapping top copper layer for strong protection against breakdown and blowout.

In coolant openings, copper top layer is formed down, utilizing copper's higher resistance to corrosion in contact with coolants and anti-freeze solutions.

Compressibility is precisely controlled by the use of finest long fiber asbestos millboard, milled in Victor's own plant.

Victor Manufacturing & Gasket Co., P.O. Box 1333, Chicago 90, Ill.



VICTOR

"ORIGINAL EQUIPMENT"

Gaskets and Oil Seals

SEALING PRODUCTS EXCLUSIVELY

Pan-American

RACE HIGHLIGHTS

Special Dispatch
to AUTOMOTIVE
INDUSTRIES

LINCOLNS and Mercedes-Benz cars swept the Third Annual Pan-American road race that started Nov. 19 in jungle weather near the Guatemalan border and finished Nov. 23 at Juarez, Mexico, in a freezing rain. Only 40 cars finished out of

Right shows one of the 18 cars wrecked during the race. This Ferrari, driven by Ruiz Echevarria of Mexico, left the road and overturned near Puebla. Although the car was badly battered, the driver escaped injury. International News photo.

a field of 94 that had started.

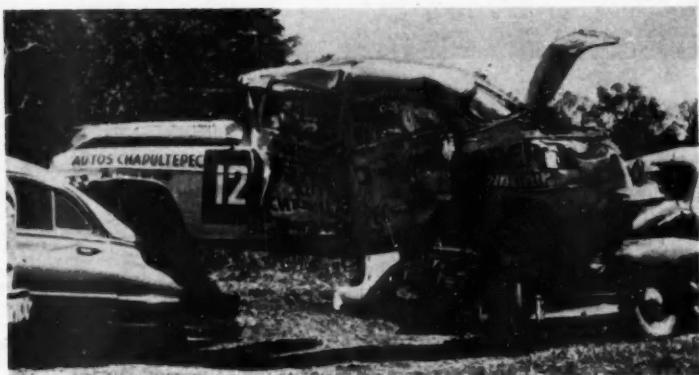
Chuck Stevenson, holder of the 1952 Triple-A racing championship, won first place in the stock car division. His prize money was \$11,628. Driving a Lincoln, he paced a field of Lincoln drivers who swept the first four places in the stock class. All were 1953 models, and were equipped with automatic transmissions. Stevenson averaged 90.93 mph, breaking last year's record.

Second place winner in the stock car class was Johnny Mantz. He finished just 31 seconds behind Stevenson. Walt Faulkner and Capt. Bob Korf finished in third and fourth positions. Reginald McFee, driving a Chrysler, took fifth place.

Stevenson, Mantz and Faulkner, all veteran Indian-



Chuck Stevenson, AAA champion and his co-pilot, Clay Smith, with their 1953 Lincoln after finishing first in the stock car division. International News photo.



apolis drivers, disclosed that Clay Smith, one of America's top mechanics, supervised their cars throughout the race and "got the maximum speed and handling qualities out of the mechanical side while we took care of the driving."

Smith said "handling characteristics and added horsepower" helped the Lincolns win. The horsepower is 205 for the 1953 models (see Lincoln engine description, Dec. 1 issue of AUTOMOTIVE INDUSTRIES, page 65). Smith stated there was no mechanical trouble with any of the winning Lincolns although he said Korf had trouble with a broken fuel line to his auxiliary tank.



Mercedes-Benz, driven by Karl Kling, Stuttgart, Germany, crosses the finish line to win in the sports car division. United Press photo.



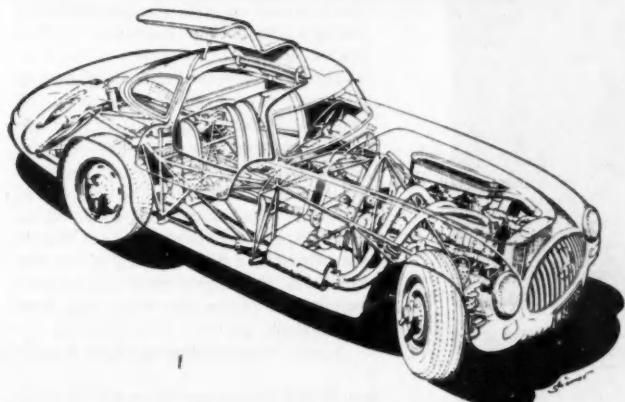
Mexican race driver Hector Riva Palacio was injured when he failed to negotiate a bridge near Mexico City and hit five parked cars with his Oldsmobile. United Press photo.

All cars had the back seat taken out and replaced with an auxiliary tank that carried anywhere from 40 to 60 gallons of gasoline. Most cars went out of the race due to brake trouble, according to Clay Smith. This, he said, caused loss of time or eventual disqualification by failure to reach a leg deadline in the maximum time. Other cars had transmission trouble over the towering mountain runs. Some were in trouble with axle difficulties and engine failures.

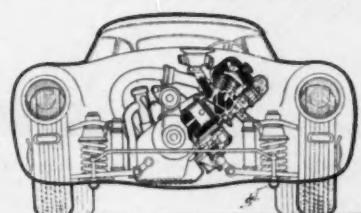
Smith said he measured gas consumption of his three Lincolns after the first 300-mile run and noted a difference of less than two liters with the three. The cars averaged about six mpg at top speed. "Oil consumption was practically nil," Smith said.

A technical committee composed of Manuel Robleda (Hudson Co.), Octavio Montero (Chrysler Co.), Luis Flores (Ford Co.) and Felipe Jenkins (General Motors)—all engineers—carried out the official inspection on the winning cars, and found that all of them conformed to the requisites for the stock class, as outlined in the

(Turn to page 102, please)

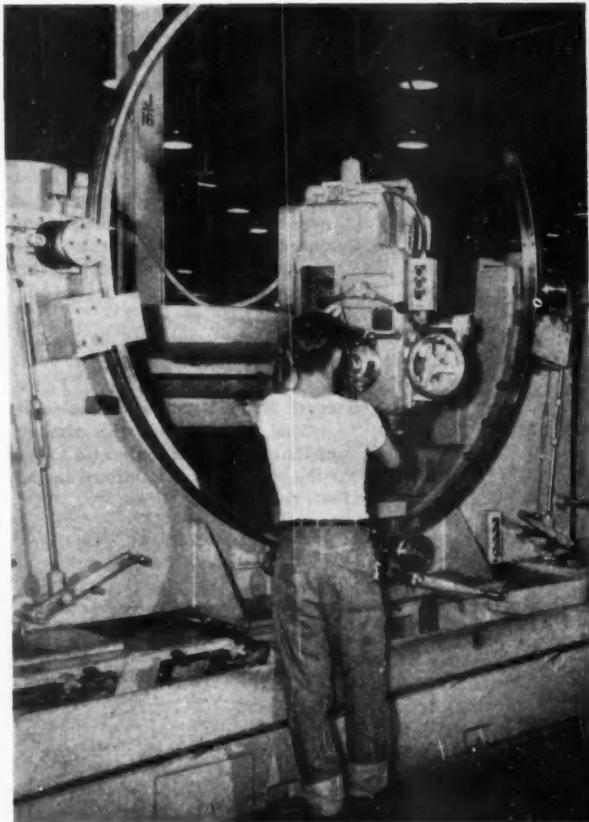


Location of principal components is shown in these two cutaway views of the Mercedes-Benz 300 SL. Note that the engine is mounted with the cylinder block at an angle of 45 deg to lower the center of gravity of the car. Illustrations courtesy of Motor-Rundschau, Germany.



From Open Fields to Tank Production in 18 Months

By Thomas Mac New



A special roller type fixture is used in conjunction with sliding bushing plates for drilling various holes in the turret ring with a Morris radial arm drill.

J

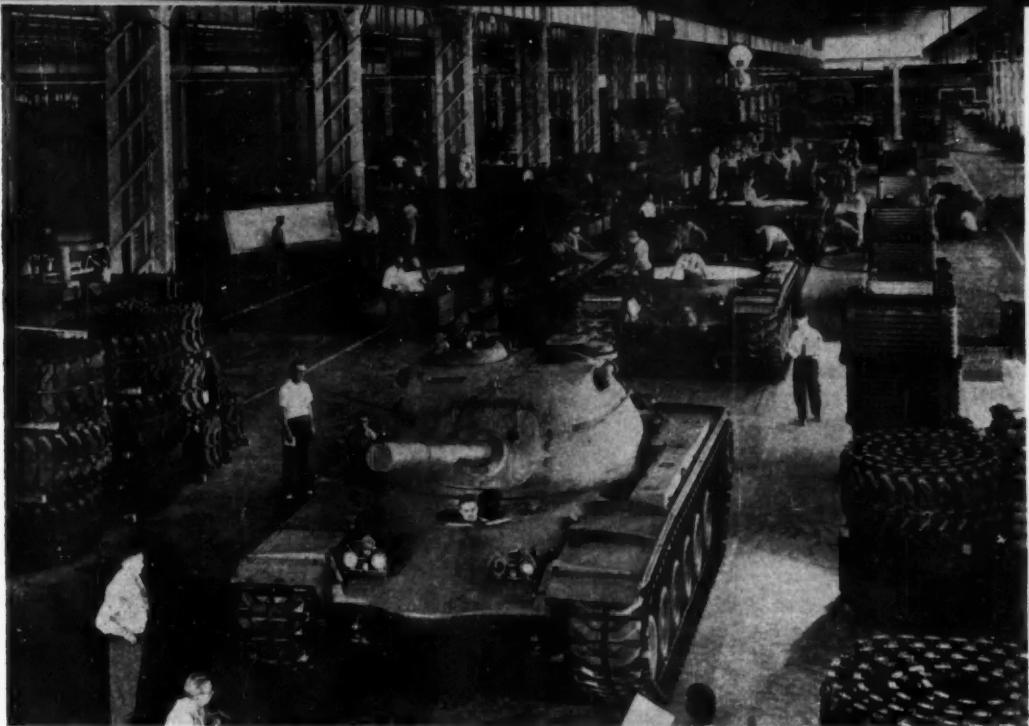
UST a short time ago the Chrysler Delaware Tank Plant, Newark, Del., rolled its first completed production T-48 (the Patton 48) medium tank off the assembly line. This manufacturing accomplishment was completed in approximately 18 months from the start of building operations to actual tank production. However, a pilot model T-48 was turned out in something less than 12 months.

In order to supply the military with the most equipment in the shortest time span, the plant has been equipped with the highest production machine tools and related equipment that are available for heavy components peculiar to tank manufacture. Some of the original tooling was described in *AUTOMOTIVE INDUSTRIES*, April 15, 1952. This article covers some of the machine tools installed since that date.

One of the interesting units that is being utilized for the mass production of a T-48 component is a Cross Transfer-matic. This machine, which performs metal cutting operations on the compensating idler arm of the tank's suspension system, has eight heads and has been set up with a square-cornered merry-go-round type conveyor, as illustrated.

The workpiece is located and held in a special fixture which is propelled by the chain-driven conveyor. It proceeds around the conveyor to the first machining station. A hole is bored in each side of the idler arm to an inside shoulder. Four heads are mounted on each side of the conveyor for the rough, semi-finish and finish boring of the two holes. A production rate of approximately six pieces per hour has been established.

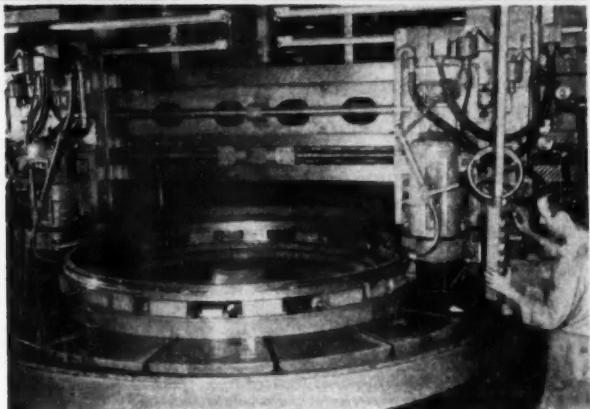
Another interesting machine tool is



Chrysler's Delaware Tank Plant is now in production on the General Patton tank. Here the tanks are seen coming off the final assembly line.

a Fellows gear shaper that is used to cut 300 gear teeth in the turret ring gear. For this operation, the gear shaper table has been equipped with a specially made dial indicator gage to check gear accuracy. The indicator fixture is mounted on a large pin, as illustrated, at the center of the ring gear and it rests on the edge of the ring gear by means of two small wheels which are attached to the gage. An operator moves the gage along the rim of the ring and uses a small lever to move the dial indicator into contact with the gear teeth.

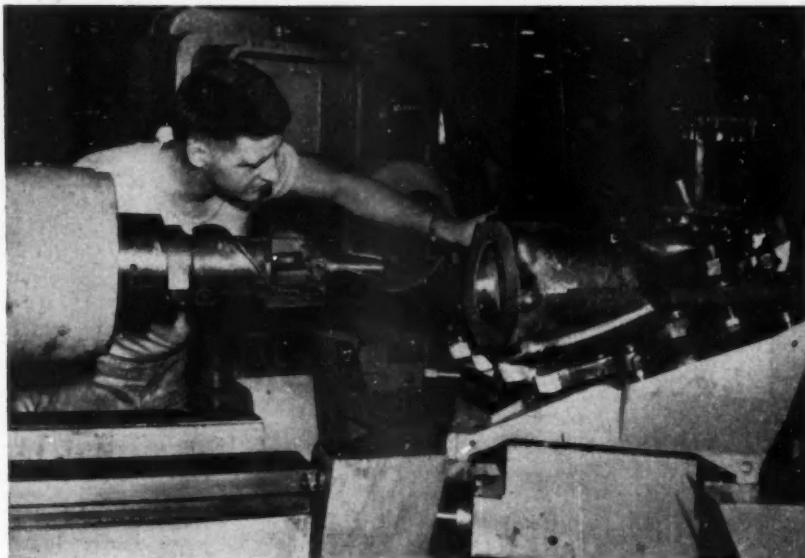
Using a sulfur base oil, the Fellows unit roughs and finishes the turret ring gear. The tool operates at 70 strokes per min on the roughing cut and 89 strokes per min on the finishing cut. A production rate of one gear per four hr is obtained — this includes setup and cutting time. Actual cutting time is said to be two hr and 55 sec. Gear rotation is 0.354 in. per stroke or an average of about 0.1 rpm for both the roughing and finishing cuts. The turret ring gear has a pitch diameter of 85.7 in. and has a diametrical pitch of 35 with a 25 deg pressure angle.



For grinding the ball race and pilot diameter of the turret ring a Niles vertical mill, equipped with two Pope grinding heads and Hoaglund contour dressers, is used.

Three hundred gear teeth are cut into the tank turret ring by a Fellows gear shaper. Note the dial indicator fixture mounted on the large pin at the center of the ring.





Suspension housing brackets are bored and grooved on a five-station Cross rotary table unit.

For grinding the ball race in the turret ring, a Niles vertical mill equipped with two Pope grinding heads is brought to play. One grinds a lip on the OD of the ring while the other grinds the top face. Grinding wheel speed of both heads is 5000 sfpm.

In another operation on the turret ring, a standard Morris Mor-Speed radial arm drill is used in conjunction with a special fixture for drilling various holes in the turret ring. Here, the head of the drill is located inside of the vertically mounted ring. The unique turret ring fixture has a crank for rotating the ring

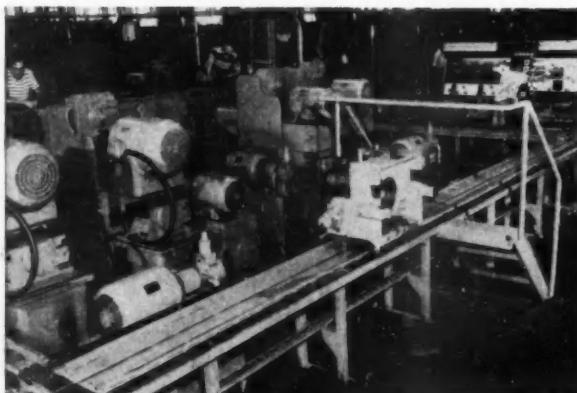
—it rests on wheels—to various locations without disturbing the drill settings. A toggle action is used to hold the ring in place, and several different slide-in drill jigs can be inserted at the bottom of the fixture.

For operations on the suspension housing support bracket, a Cross fluid motor driven rotary index table unit equipped with four heads is used. Carbide boring tools are used with Cimcool coolant to rough and semi-finish bore and groove the multi-diameter wheel spindle holes in the cast armor brackets which has a hardness of R_c42. Having a five station index, three stations

are used for boring, one for grooving and one for loading and unloading. A feed of 0.020 in. is used for roughing and a feed of 0.012 in. is used for semi-finishing operations with the tools running at 120 sfpm. A special inclined fixture is used to mount the bracket on the Cross rotary table so that the center line of the wheel spindle hole is on the same horizontal plane as the center line of the tool.

A hollow spindle for the suspension system is threaded on a Jones & Lamson thread grinder equipped with a Westinghouse Precipitron and a Barnes magnetic separator. The part is made of SAE 8653 steel and has a hardness of R_c35. In use, the Precipitron arrests coolant vapors by a static electrical action, regenerating vapor to a fluid and returning it to the coolant tank. This prevents the vapor from spreading to adjacent areas as well as loss of coolant. Utilizing a magnetized drum, the Barnes unit removes metallic par-

Tank compensating idler arms are machined on a Cross Transfer-matic equipped with a square cornered merry-go-round type conveyor. Four heads are mounted on each side of the conveyor for boring a hole in each side of the arm.





The unit in the foreground was devised by Chrysler engineers for putting tracks on tanks. It consists of three winches, one to pull the tank onto the tracks and two for pulling the tracks up over the bogies until the front and back can be joined.

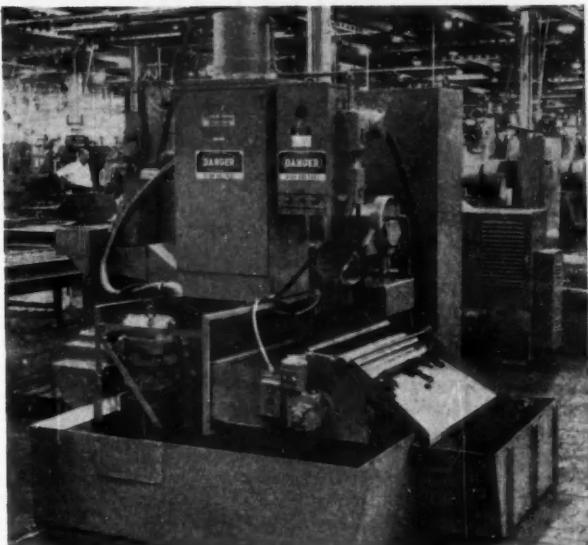
ticles from the coolant by the magnetic action of the drum. As the drum rotates the particles are scraped off and deposited in a container for removal. The coolant is fed back to the machine.

It is of interest that crush grinding is used for grinding 92 serrations on the OD of the hollow spindle with Van Norman or Thompson crush grinders, which is said to be the first time that crush grinding has been undertaken in the production of parts for tanks. By using this method, the grinders remove five cu. in. of metal every 12 min. Wheel size is 16 in. on the Van Norman units and 12 in. on the Thompson machines; both tools have a wheel speed of 5000 spfm.

To filter the coolant on the Van Norman and Thompson units, Delpark separators are used. Here, coolant is dumped from the grinder onto a cloth filter which removes the foreign particles and deposits them into a metal tray for removal. The filter cloth is mounted on a roll at one end of the coolant tank and is stretched over a metal screen to the opposite end of the tank where it is accumulated in a tote box as it is used. Coolant is recirculated back to the machines.

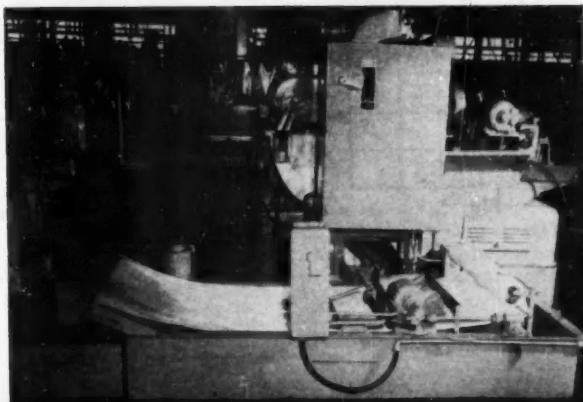
The hollow spindle is internally broached on a Colonial with 57 internal splines to receive the spring torsion bar.

(Turn to page 92, please)



A Westinghouse Precipitron is used for arresting coolant vapors and a Barnes magnetic separator is utilized for removing metallic particles from the coolant that is recirculated to a Jones & Lamson grinder. The J & L unit grinds threads on a hollow spindle for the suspension system.

Van Norman grinders for grinding splines in a hollow spindle are equipped with Delpark coolant filters.



STATISTICAL QUALITY CONTROL

in Relation to Engineering

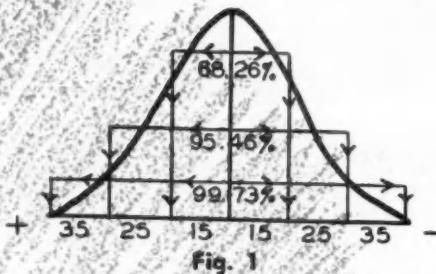


Fig. 1

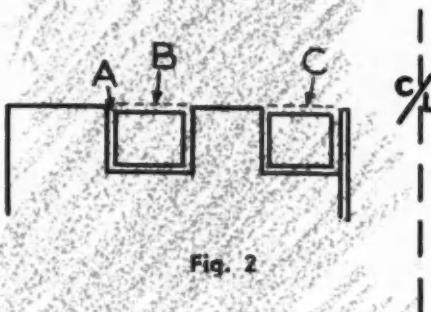


Fig. 2

| PUMPS | CLEARANCES | | |
|-------|------------|---|---|
| | A | B | C |
| I | 3 | 3 | 4 |
| II | 4 | 4 | 3 |
| III | 1 | 5 | 5 |
| IV | 2 | 1 | 2 |
| V | 5 | 2 | 1 |

Fig. 3

| SPEED | PRESSURES | | | | | | | | | |
|-------|-----------|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | I | J |
| I | 1 | 1 | 3 | 3 | 2 | 4 | 2 | 2 | 2 | 2 |
| II | 1 | 1 | 2 | 4 | 3 | 4 | 1 | 4 | 4 | 4 |
| III | 1 | 1 | 1 | 5 | 1 | 1 | 1 | 2 | 2 | 2 |
| IV | 1 | 1 | 3 | 1 | 2 | 2 | 1 | 3 | 3 | 3 |
| V | 2 | 2 | 4 | 2 | 2 | 3 | 1 | 1 | 1 | 1 |

Fig. 4

HERE are undoubtedly concrete examples where engineering departments have definitely used statistical quality control within their designs, but none of this type of work is available. Any discussion on this related subject must be done on theory only.

The prevalent thought that the design engineer draws a rough picture of his wants, then hands it to the chief engineer who sets it up to the closest inch, then he, in turn, hands it to the draftsman to detail to the thousandth of an inch; and the original thought now completed except for the tolerances, the junior draftsman takes over and not wishing to get caught with any errors, sets down the closest tolerance which he can safely assume at the moment, and then divides it in half to be sure he is right, must certainly be accepted jokingly.

The problem at hand must be studied, and perhaps preferably at this time, strictly on the theoretical. It must be added quickly that the theory discussed here has been applied, practically, in a limited number of cases but a sufficient number to know it is practical. The

thought can be accepted without argument that no two things have ever seemed to be exactly alike. Piece-parts in any process vary one to the other. This variation and its tendencies are all important. It must be thoroughly understood if any sense is to be made of the subject.

Within any process, regardless, variation is present. It is present in everything and in anything. In manufacturing, variability of

By Walter S. Oliver
Detroit Gear Division
of Borg-Warner Corp.

machined parts, heat treated material, assemblies, and what not, is the final answer to the end product. If the processes are not within engineering specification, they still have a variability within themselves. Whether this variability is what is required or not, it is still there. It is the controlling factor. Therefore, the problem in engineering is to deal with this variation as it is portrayed and understood in statistical quality control. In manufacturing, the problem is to strive to attain and maintain this variability in relation to statistical quality control techniques and as engineering requires. This variability, statistically, is most of the time set forth in the form of a distribution curve. Theoretically, as the design or chief engineer would use it, it is known as the normal curve.

There are different types of circumstances which give the understanding of any certain variability which is being studied, but for the purpose here the discussion will be only with the normal frequency distribution curve of probable error.

The statistically correct frequency distribution curve (Fig. 1) is a symmetrical bell-shaped curve with the peak or mode bisecting it in such a way that the observations, whatever they be, are evenly divided toward the positive and negative side. The distance from the extreme positive to the extreme negative across the base of the curve is known as the dispersion. This particular type of curve or distribution is sometimes referred to as "the Bible." Quality control work and thinking are based on this curve. It is the ideal. If this near perfection could be obtained in manufacture, 68.26 per cent of the particular observations would be one standard deviation distance on each side of the mean dimension; 95.46 per cent would be within two standard deviations of each side of the mean; and 99.73 per cent would fall within three standard deviations of each side of the mean. These standard deviations are statistical measures which divide the theoretical perfect distribution into the percentages quoted. Since 99.73 per cent is the best that can be done, then the reference "near perfection" is proper.

The entire problem of statistical quality control in relation to engineering seems to evolve itself around several different organizations within today's production and manufacturing problems. There is the design engineer, the chief engineer, the tool engineer, the motion-study engineer, the master mechanic, the inspection department, and others. Each of these is a

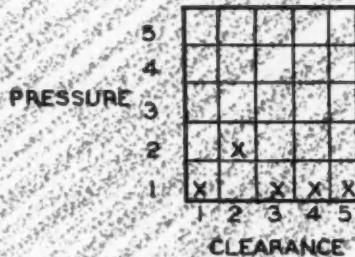


Fig. 5

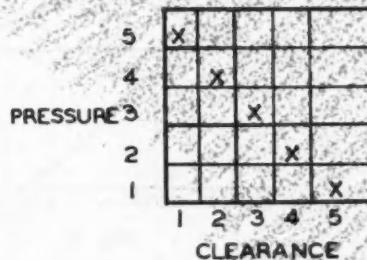


Fig. 6

discussion of its own and since the entire subject cannot be covered at this time, the discussion will be only on the basis of tolerances. However, if the various divisions of engineering understand and use these techniques, more concrete answers are attainable than in the past and some in the past have not been too conclusive. The design engineer and the chief engineer who understand the techniques of statistical quality control will be able to see the reputation of their product, the advancement of their design, life of the product and interchangeability, more clearly, and perhaps in a different light than heretofore. Regardless of how much we jokingly accuse the chief engineer of using the data book to get the tolerance or how much we talk about the tolerances being twice as close as needed because someone knows the shop will exceed them and thereby the product will finally be as wanted, the techniques of statistical quality control setting tolerances scientifically can be a great advantage. In fact, there is some thinking that engineering will not set tolerances but merely state the mean dimension and then statistical quality control techniques will set the tolerances.

To develop our subject it seems that a pump of simple construction may be used as a good example. The requirements of this pump are to produce 60 to 80 lb of oil pressure per sq in. and to deliver one gallon of oil per minute. The pump itself consists of four parts (Fig. 2: pump body, large internal tooth gear,

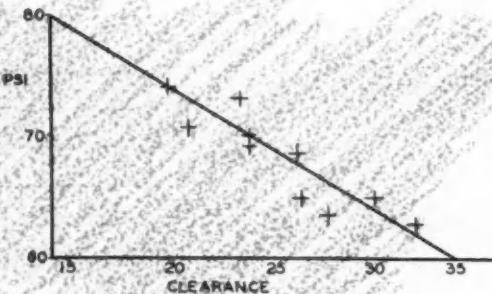


Fig. 7

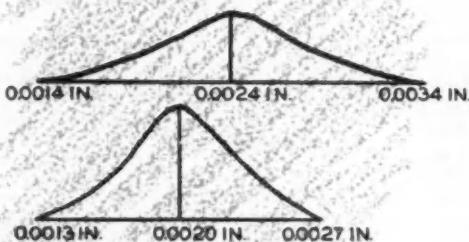


Fig. 8

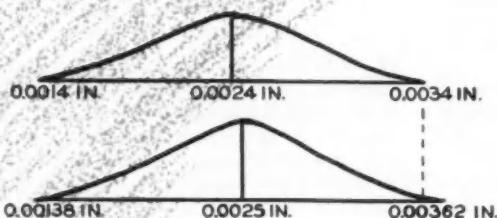


Fig. 9

small external tooth gear, and bronze guide bushing.

This pump was designed and later engineered with a nominal set of tolerances, all of 0.001 in. Pumps were built within these tolerances and tested. The tests proved that the tolerances given would develop between 60 and 80 psi and one gallon of oil per minute as required by the specifications. Therefore, the parts and the final assembled pump, were released for production.

This pump caused considerable trouble for some time in manufacturing and assembly as well as in the field. One morning the manufacturing situation became quite serious and, by the use of some quick analysis and a few curves, one tolerance was doubled. This remedied the trouble at the moment. It was then decided to analyze this decision thoroughly and, if right, try to sell engineering to make the change.

The first step by the quality control department revealed that the pumps, as being manufactured, providing all parts were to specifications, were delivering from 65 to 75 psi, and with a fluctuation about one gallon of oil per minute, but mostly under.

Next, five pumps with all parts chosen at random were built with all dimensions recorded. These were then reduced to clearances between the mating parts. For the purpose of ease of statistical analysis this was then expressed in ranks. For instance in Fig. 3, pump No. 4 has the tightest fit in clearance "B" - 1; and pump No. 3 has the greatest clearance - 5.

The five pumps were then run on a dynamometer under the same surrounding circumstances to determine the pressure received from the five random fits, controlling these speeds from idling motor speed to 3000 rpm.

These results also were set up in ranks, similar to the fits. The lower pressure being 1 and the greatest pressure 5, as in Fig. 4.

Since there are three clearances (A-B-C) and nine speeds (a to i), it was necessary to set up 27 graphs, setting clearance against pressure, similar to Fig. 5 and Fig. 6.

For example in Fig. 5, setting clearance "B" against pressure at speed "b," there is no indication of trend or pattern.

But setting clearance "B" vs. pressure at speed "c" (Fig. 6), there is a very definite trend.

In exploring all 27 of the trends from random fits at the various speeds for the indicated pressures, the relationship between clearance "B" and speed "c" was so definite that this relationship was graphed dimensionally as in Fig. 7.

These plottings very closely approximate a straight line. It is so near a straight line that it was decided to figure mathematically what the straight line correlation would be. It turned out a minus 94 per cent.

The minus 94 per cent means merely that the relationship was inverse—high clearances gave low pressures and low clearances gave high pressures.

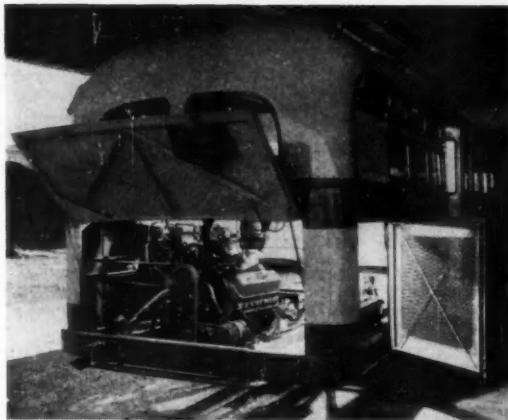
An equation representing the relationship between the clearances and the pressures was calculated using the "least squares" method. This result was $Y = -0.982X + 93.4$; where Y is the pressure and X is the clearance.

Therefore, if Y (pressure) can vary from 60 to 80 psi, then by this analysis, the clearance 'B' could vary from 0.0014 to 0.0034 in. The mean of 0.0024 in. will

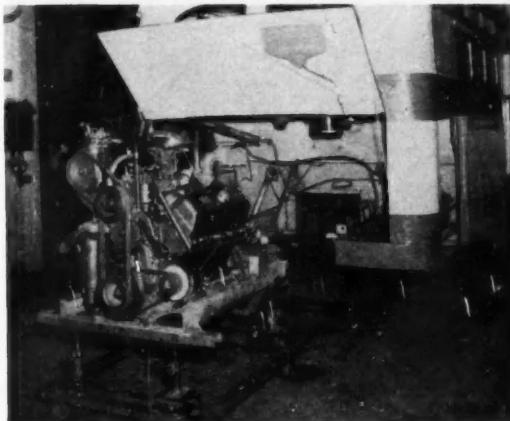
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New Models 328 and 332 Transit bus (28 and 32 passenger) are light weight for low-cost operation. A 330 cu in. overhead valve Continental engine powers these models.



The new Model 340 (40 passenger) Transit bus is said to be the first application of the V-8 overhead valve engine to a heavy duty bus. This LeRoi engine weighs only six lb per hp and is exceptionally compact.



The power plant is mounted in a sub-frame so that the entire unit can be quickly removed from the bus by simply breaking connections and taking out four bolts.

TRANSIT Brings Out

New Low-Cost Buses

Two new buses, lower in first cost and designed for easy maintenance, have been brought out by Transit Buses, Inc., a subsidiary of Checker Cab Mfg. Corp.

The Model 340, a 40-passenger vehicle, is powered by a Le Roi Model T-H540 overhead-valve, V-eight engine of 540 cu in. piston displacement which develops 207 bhp at 3200 rpm. A torque converter and power steering are optional.

A 145-hp Continental K-6330, six cylinder, overhead-valve engine of 330 cu in. piston displacement is used in the Models 328 and 332 buses. A torque converter is offered as optional equipment.

Many features are common to vehicles equipped with either engine. The power plant is so mounted in a subframe that entire unit can be quickly removed from bus by simply breaking connections and taking out four bolts. This saves considerable time when an engine requires overhaul. The engine is located longitudinally in the rear compartment with a straight drive directly to the rear axle. All control rods are enclosed in self-lubricating covering for protection against road dirt, water, etc.

Engine wiring harness in the Model 340 is separate from body and chassis wiring harness, and is joined at terminal block in engine compartment. All wiring is strung through body and does not go below floor where it would be exposed to weather.

All wiring is strung through body and does not go below floor of the 328 and 332 where it would be exposed to weather.

Base prices for the new buses, F.O.B. Kalamazoo, Mich., are as follows: Model 328, 28 passenger, \$7975; Model 332, 32 passenger, \$8475; Model 340, 40 passenger, \$12,725.

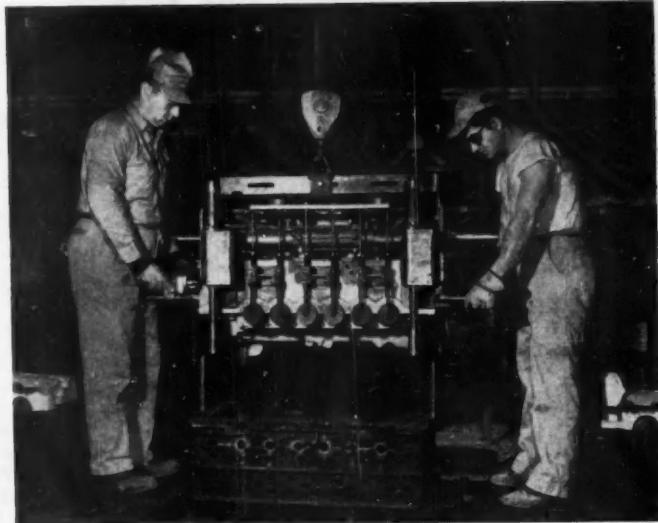
Ford's New Foundry Combines

By
Joseph
Geschelin

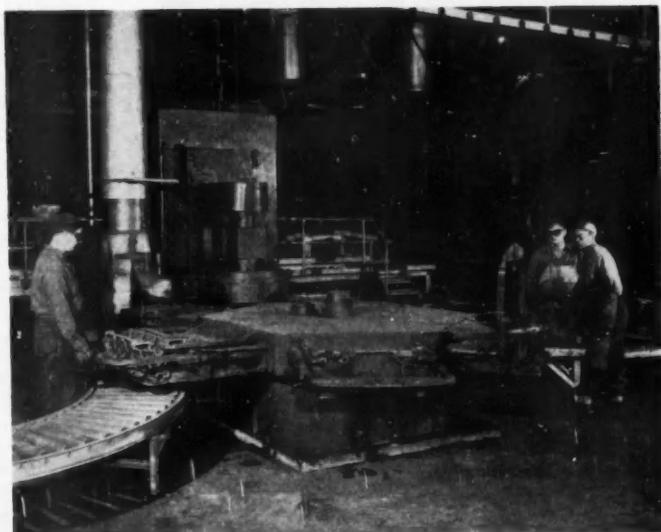
THE new Ford Motor Co. foundry now in operation in Cleveland can well justify the statement that it probably is the "world's most modern" from the standpoint of worker comfort, productivity, and extensive utilization of automation techniques. In general, it has the same atmosphere for the workers as does the nearby Ford engine plant.

Erected on a 204-acre site, the foundry provides a floor space of some 1,200,000 sq ft and is designed to make cylinder blocks, cylinder heads, flywheel housings, manifolds, and small castings for the Ford overhead valve six in current production, and for the V-8 Mercury which should be in production early in 1953. At its peak, when the Mercury engine is released for 1954 production, the foundry will be capable of turning out castings for 4600 engines a day. At this rate it will have a cupola melting capacity of 1400 tons of iron daily.

Painstaking attention was given to features contributing to comfortable working conditions and good housekeeping. To this end Ford has installed a ventilating system capable of circulating 2,800,000 cfm of fresh air to assure working areas free of dust, smoke, and fumes. All air entering the building is filtered. In addition, the cleaning area is air conditioned.



A special core-setting fixture is used for placing the completed core assembly in the drag of the mold used to make the Ford six-cylinder engine block. All the cores in the cylinder block have been properly located in the fixture and are held in position by clamps while the core assembly is lifted and placed in mold. All cores requiring fitting, inspection and assembly have the operations performed on powered progressive belt conveyors.

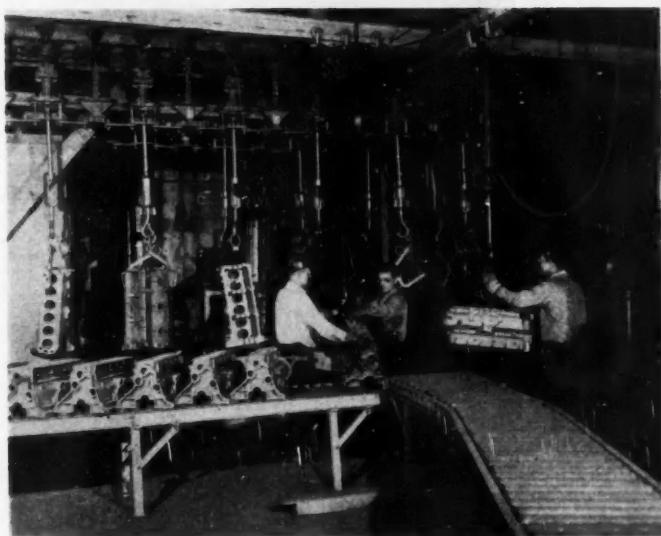


Automatic 6-station Gardner grinding machines remove metal fins and flash from cylinder blocks. After knockout, Ford six-cylinder engine blocks are loaded in a special fixture (at left). The rotary table carries each block to a 30-in. automatic grinding wheel. Blocks are unloaded at right. Material handling is accomplished entirely by the low-level, gravity-roll conveyor.

Automation and Worker Comfort



Water-jacket cores for Ford six-cylinder overhead-valve engines are made of prepared core sand by this newly-developed five-station core blowing machine. Operator at left is unloading finished core which has been formed by air-pressure. Core-drier fixture is being placed over blown cores by operator in center. Cores are placed on conveyor in background for transfer to drying ovens.



Ford six-cylinder engine blocks are placed on overhead monorail-type conveyors which carry them through Pangborn shot blast cabinets shown here. Special attention has been given to arrangement of cleaning equipment to provide a straight line process for cleaning castings. Material handling has been reduced to a minimum. Special lighting and air conditioning have been provided in the casting cleaning area.

To protect its neighbors from the usual nuisance of a large foundry operation, the cupola stacks are fitted with electrostatic dust collectors which are said to clear the exhaust smoke of objectionable particles and fly ash, thereby removing one of the causes of smog. Another innovation is the use of heat exchangers to recirculate heat through the cupola charge, thus making otherwise waste heat do useful work.

In its final form the foundry will have in operation eight individual molding lines, four of which are now in full use. The plant is intensively conveyorized, using monorail systems, molding conveyors, cooling conveyors, etc., installed by Mechanical Handling Systems of Detroit. Wherever feasible, Ford automation devices are employed to facilitate the rhythmic movement of work, to reduce manual handling, and to make transfer of work automatic to the maximum extent. One example of this procedure is the mechanism designed to feed cylinder block castings into the Pangborn blasting machines. This device comes into play automatically to remove the casting from the monorail conveyor hook, then transfers it onto a conveyor feeding the Pangborn cabinet.

In view of the enormous requirement for sand in a dry sand foundry operation of this kind, the plant has a huge indoor sand drying and sand handling area with a capacity of 54,000 tons, sufficient for 55 days' operation. Prepared core sand is dispatched to core-blowing machine hoppers through a pneumatic conveying system. Sand handling equipment was installed by Bartlett-Snow of Cleveland.

Because of the dry sand core practice here, the plant has a

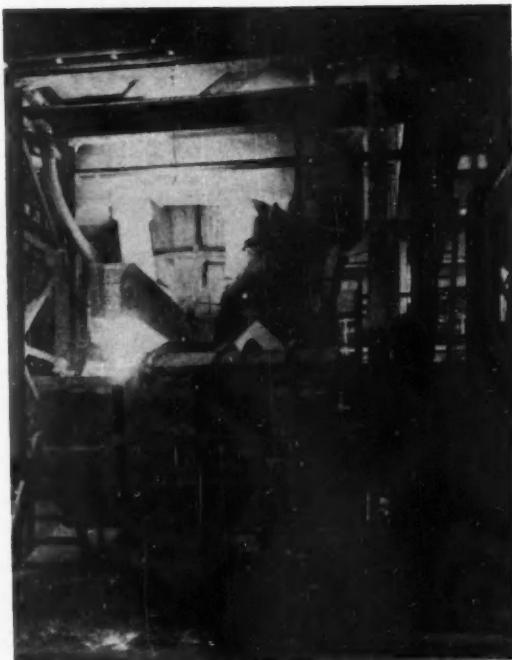
large installation of semi- and fully-automatic core blowers to increase productivity and reduce manual effort. In addition, there is a battery of new molding machines designed and built for this operation with features that go beyond usual core blowing practice. Toolled for making cylinder barrel cores, these machines blow the core with a powerful air slinger, then complete the operation by means of an automatic squeeze at the end of the cycle.

Besides automation, the plant is provided with special devices of every kind, one example being the unique hoisting equipment designed to lift core assemblies from the core box and transfer them into the mold on the molding conveyor. Not only does this speed the transfer operation, it also prevents damage to the core pieces.

Automatic equipment has been installed for various grinding operations. On cylinder blocks, for example, the top and bottom faces of the casting are rough-ground while riding on a six-place turntable, grinding being done in a special Gardner surface grinder. From this operation the blocks are transferred directly to an adjacent double-end grinder for grinding front and rear ends.

A wet-refuse disposal system facilitates easy and thorough house cleaning for the entire operations. Cooling conveyors for block and head castings are located in the specially ventilated galleries while the small parts hot-casting conveyors run through the ventilated basement, thus eliminating smoke and fumes and minimizing heat in the molding area.

It is noteworthy that the Cleveland foundry has nearly the capacity of the Dearborn iron foundry. The latter, now relieved of the Cleveland engine operation, is being completely modernized to bring it in line with future requirements. Incidentally, it seems evident that shell molding of Ford crankshafts will stay at Dearborn since there is no equipment in Cleveland for this technique at this writing.



Molten metal is tapped from the cupola into the forehearth from which the metal will be transferred to the molding lines by means of an overhead monorail crane. The ten cupolas are of the front slagging type with continuous tapping of molten iron into eight-ton holding receptacles. Overhead hot metal carriers and distributing system are electrically operated for delivery of hot molten iron from the cupola holding receptacles to the pouring areas of the various molding lines.

Core sand is prepared and mixed in a battery of automatically operated millers containing sand mixing equipment and sand delivery unit. Weighed sand and cereal binder are delivered automatically. Core oil is metered and delivered by pipeline. Prepared core sand is dispatched to the various core blowing machine hoppers and central storage bins by means of a pneumatic conveying system.



Automatic Controls Insure Emergency Power When Needed

AUTOMATIC controls on engines insure that when one power source fails or is put out of commission by any mishap, a stand-by engine, equipped with automatic controls, will be put to work operating a generator, air compressor, etc., for emergency power. With most small engines, the power plant will be on the line producing power in five seconds or less—larger engines in proportion. When the main service is restored, this same control stops the engine and resets itself for the next power demand.

The latest type of equipment, developed by Synchro-Start Products, Inc., tests itself and its auxiliary engine daily, and flashes (or rings) an alarm if the auxiliary engine lacks water or oil, or is overspeeding, or if anything else is wrong.

In general, operation of automatic control setups is as follows:

When power is required of the engine, a switch is closed to automatically open or close all circuits necessary for cranking the engine, such as fuel and water valves, cranking circuit, and solenoid-operated governor controls. When the engine starts, all circuits necessary for starting are opened while those for running are held closed.

If the engine fails to start promptly, cranking will continue for approximately 25 seconds, after which the starting motor will be stopped for about 10 seconds and then operated for a short period of about seven seconds. The control set will disconnect the current to the engine and energize a circuit to an alarm, signal light, or stand-by engine if five of these interrupted cranking cycles fail to start the engine. This cranking cycle may be varied for particular installations, as required.

The control circuit will go through one short cranking cycle if lack of fuel causes the engine to stop, and

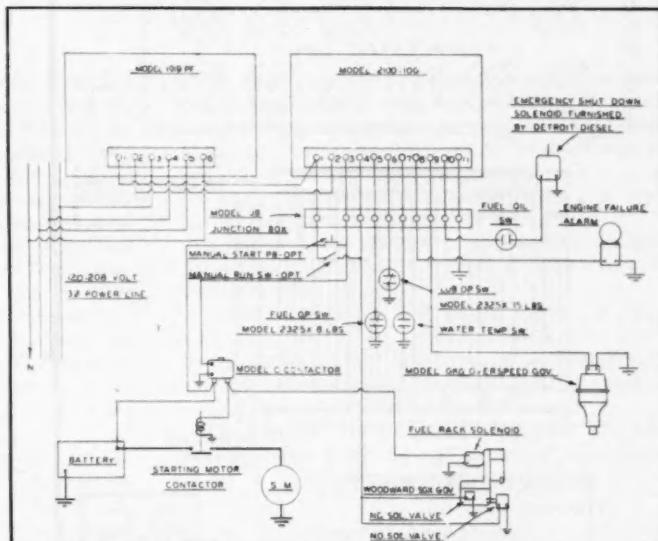


Diagram of Synchro-Start Model 2100 IOG, showing engine control set connected with voltage sensitive relays which acknowledge loss of voltage from normal source. Failure of the three-phase power line causes the 1919 PF (power failure) relay to activate the 2100 IOG control which in turn starts the engine. As the engine comes up to speed, an automatic transfer switch (not shown) operates to place the load on the generator. The engine is then stopped automatically on power restoration.

will then shut off. The main control switch or the safety switch must be opened for about five minutes after any shut-down caused by abnormal conditions before controls will again operate to obtain another full starting cycle.

Overheating, oil pressure failure, overspeeding, or other abnormal occurrences while the engine is running will be detected by the control set and the engine will be stopped. When a shut-down occurs, a circuit is energized to operate an alarm or to start a stand-by engine.

Pittsburgh Plate Glass Co. is a typical user of automatic control. It has recently installed such equipment with a Hercules engine at its Clarksburg, W. Va., plant to insure immediate production of emergency power should the prime source fail. This would generate enough current to permit processing of plate glass already in the works, and drive fans to cool sheet glass. A short time ago, the International Harvester

(Turn to page 92, please)

Pit Type Provide

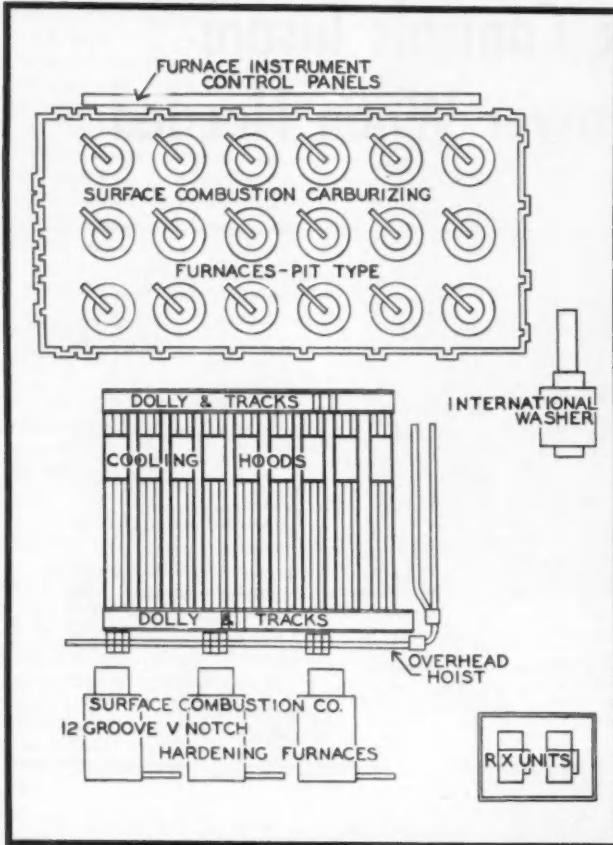


Diagram showing location of gas generating, washing, carburizing, handling, cooling, and hardening facilities in Caterpillar's Peoria plant.

In keeping with its policy of employing the most effective and economical methods of heat treating, the Caterpillar Tractor Co. has recently installed gas carburizing furnaces of Surface Combustion design at the Peoria, Ill., plant. These furnaces are used to treat five sizes of track link bushings made of steel with a minimum grain size of ASTM No. 6 and a chemistry very similar to SAE 1020. This steel is pretested before production by both the steel mills and Caterpillar's metallurgical department.

Pit-type batch furnaces were selected to carburize the large volume of bushings because they appeared to have design advantages over the larger, continuous-type furnace for operation under conditions found at this plant. With the burden divided among many furnaces, production is not seriously affected by the breakdown of a single unit.

General layout of new carburizing facilities. In the foreground is a basket section loaded with bushings for treatment.



Carburizing Furnaces Flexible Setup

By D. J. Wright, General Superintendent
Heat Treating Division, Caterpillar Tractor Co.

Maintenance, manpower, cost of energy and time lost during weekend shutdowns—all are at a minimum. The multiple installation affords a wide flexibility in respect to cycling for case depths, load density, ratio of exposed surface area to weight, etc. Such variables are encountered when heat-treating is geared directly to the flow of a variety of parts from the machine shop.

The diagram shows the general layout of the carburizing furnaces and their auxiliary equipment. Eighteen furnaces are located in an 80-ft by 40-ft basement which is 12 ft deep. These furnaces are loaded and unloaded with a five-ton, floor operated overhead crane, the control of which is facilitated by indicating marks painted on its wheel frame, runway and bridge. Governing controls of the furnaces are located in the instrument panels.

Carrier gas for the furnaces is supplied by two endothermic-type, Surface Combustion RX atmosphere generators. The carburizing gas is natural gas (1000 Btu), while the burner-fuel gas is either natural or a mixture of propane, air and natural gas. All pipes used in the installation are marked with a color code to indicate the media conveyed, such as carrier gas, natural gas, fuel gas, air, water, etc. Similarly, all wires are marked with a numeral code.

Nine hooded coolers, exhausted to the roof, can cool

at one time 27 sections of baskets used in the furnaces. Beyond each cooler is room for nine carburizing container sections on the conveyor which moves the work to the three hardening furnaces. An overhead hoist at one side of the coolers and conveyors is used to move the empty "can sections" to a storage space or back to the bushing turning machines for reloading.

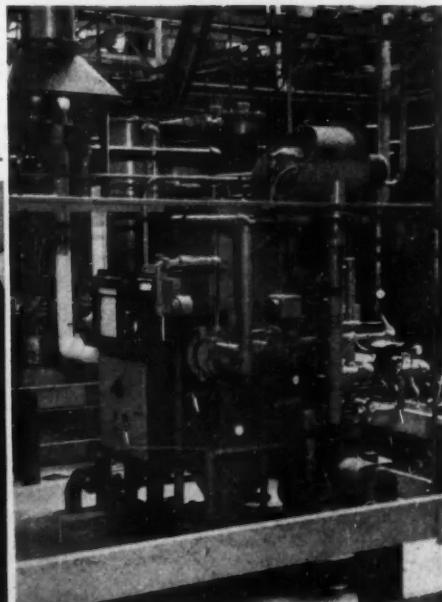
A washer is also included in the layout, for removing oil and dirt from the bushings after they are packed for carburizing.

Each furnace has an 18-ft height and nine-ft diameter, along with a work space of 66-in. height and 38-in. diameter. The unit is set in an overall floor grating that comes within 30 in. of its lid. Its shell is of gas-tight, welded steel construction.

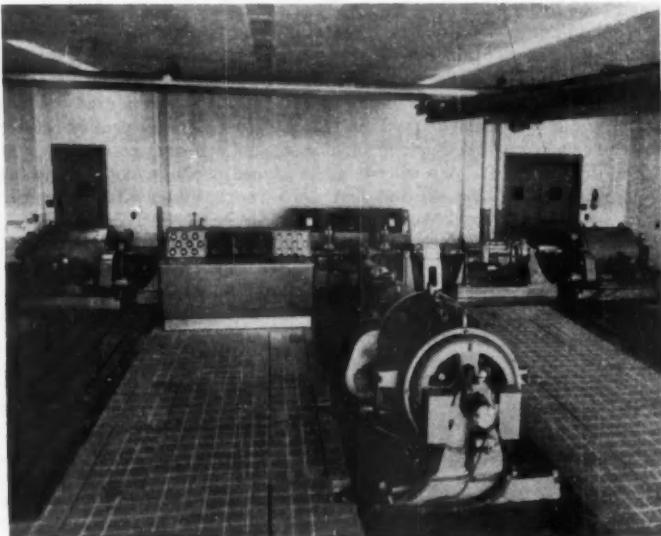
The furnace is heated by 12 U-shaped, gas-fired radiant tubes which operate at below atmospheric pressure. (Turn to page 80, please)

Surface Combustion RX atmosphere generator that produces carrier gas for use in carburizing operations in new pit type furnaces.

Basket loads of carburized bushings are moved on roller conveyors to cooling vents.



International Harvester Unifies Engineering Facilities

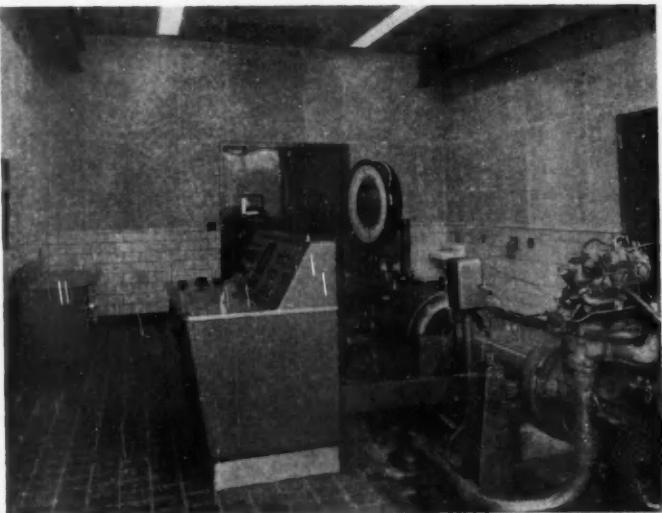


This enormous piece of equipment in the axle laboratory consists of a General Electric 300-hp driver dynamometer and two, 250-hp absorbing dynamometers. Foxboro recording or indicating potentiometers and torque meters are employed. The set-up is flexible. As shown, it is a T-arrangement for torque capacities of all present day axles used in vehicles up to 50,000 GVW. Where still greater axle capacities may be desired, the equipment can be readily rearranged to an E-shape. Vertical loading of axle housings is done hydraulically. The dynamometers are of regenerative type so that the power generated in the absorbing units can be used to assist in driving the input machines. This is effected through a remote four-unit motor generator set.

RECENTLY (see AUTOMOTIVE INDUSTRIES, October 15, 1952) International Harvester Co., dedicated its \$8-million motor truck engineering building and laboratories in Fort Wayne, Ind., for the first time in its history consolidating motor truck product engineering and advanced engineering groups under one roof. About 633 engineers and other personnel are employed to carry on the work at its current level of operation.

The building is air-conditioned except in shop and test areas where adequate forced draft circulation is employed. In addition, temperature and humidity control is provided in special areas such as the electronics laboratory, air flow laboratory, and instrument room. The supply, recirculation, and exhaust

Here is one of the 18 development test cells, having dynamometers ranging in capacity from 40 to 400-hp, six being double-end as shown. Dynamometers incorporate the latest electronic speed and load control system. These cells are protected by a Cardox CO₂ fire extinguishing system with manual and automatic controls.



Test cell seen at right is equipped with a General Electric 300-hp dynamometer, the test being a torsional vibration investigation using the Cox piezo ray torsion analyzing equipment produced by Commercial Research Laboratories. The control console, designed by IHC and built by GE, contains a Chronotach time and speed indicator; and an electronic type tachometer.

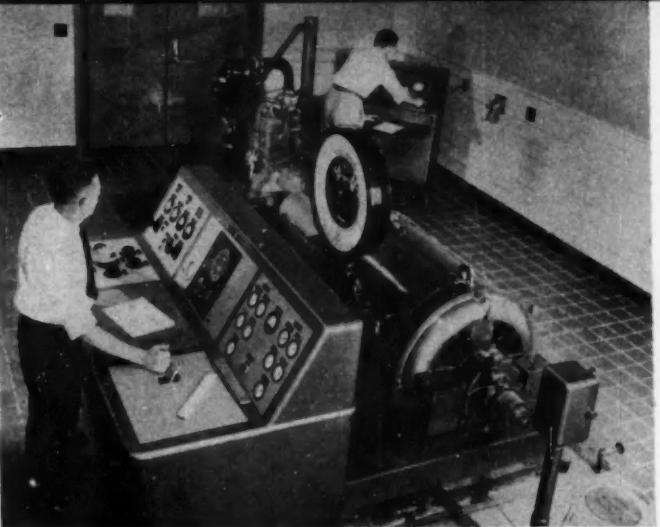
of air is maintained by 139 fans which have a capacity of 2,250,000 cfm. Air change ranges from once every 30 seconds in test cells to once every six minutes in the drafting room.

Work in the engineering department is carried out under a system consisting of three general types of projects: test, design, and fabrication. The test and development section comprises six groups: component assembly, axle and transmission laboratory, hydraulics laboratory, physical and electrical laboratories, and road testing.

Engine testing facilities include 30 test cells, 24 of which are equipped with 30 dynamometers. Twelve dynamometers are devoted to endurance testing, 18 for engine development and testing. One test cell contains a single-cylinder engine for preliminary investigations on combustion chambers, ports, and compression ratio.

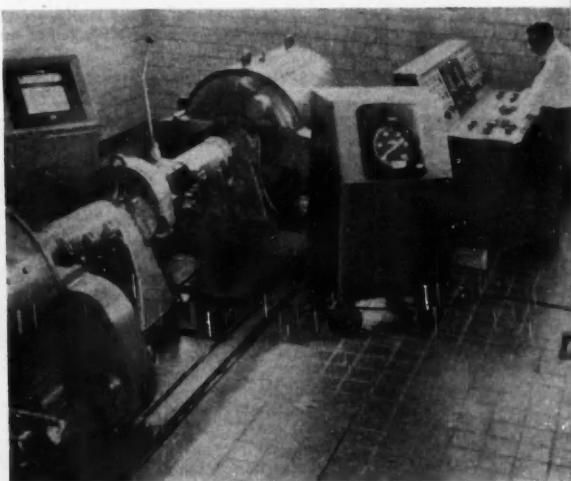
A noteworthy feature is a cold room where complete trucks can be exposed to temperatures can be exposed to temperatures (Turn to page 88, please)

One of the many test set-ups in the component testing section is this arrangement for life testing of the steering gear assembly under high load conditions. The machine reproduces road shock and steering loads on a continuous cycle by a control system duplicating wear patterns established in service.



View in typical endurance testing laboratory. IHC has six of these cells, each equipped with two inductor-type General Electric dynamometers of 250 and 400-hp capacity. The instrument console of the left, designed by IHC, includes a flow meter and well as other instrumentation.

One of the two test cells in the transmission laboratory, equipped with a 300-hp driver and 400-hp absorption General Electric dynamometers. The other cell is equipped with a 150-hp driver and 200-hp absorption machine. The facilities are used for development testing to determine efficiency and friction losses as well as endurance characteristics of transmissions, auxiliary transmissions, torque converters, power dividers, and transfer cases.



V-12 Tank Engine Production

at

Chrysler Plant



Some impression of the forest of towering Bullard Multi-Au-Matics in this plant may be gained from this view of one of the Bullard bays.

The Greenlee transfer machine for completely machining cylinder heads in a brief, continuous cycle is so huge that this overall perspective does not do it justice.



FIFTEEN miles out of downtown New Orleans, in a modern air-conditioned plant erected during World War II for building aircraft, is the Michoud Ordnance Plant, a Class II Army Installation operated by the Chrysler Tank Division, Chrysler Corp. Currently embracing a floor space of 1,600,000 sq ft (to be expanded to 2-million sq ft, ultimately) the facility is equipped for the manufacture of Continental V-12 aircooled gasoline engines for medium and heavy tanks produced at the Chrysler tank plant in Newark, Del.

Close-up of one of the multiple-head Kingsbury drilling machines designed for the piston job. It drills two banks of piston ring smoke holes—one with six holes, the other with eight; in addition, the vertical inclined head bores two valve clearance recesses in an angular position.

By Joseph Geschelin

Less than 11 months after the Chrysler organization moved in on this project the first carload of engines was shipped to Newark. During that period it was necessary to rehabilitate the building, order machine tools, install material handling conveyors and process equipment, and organize the plant layout for mass production of these engines. At the present time more than 1100 machine tools are in operation, several hundred of these having been secured from Government stores.

As in the case of other operations of this character, a goodly percentage of new machines required for specific operations still remains undelivered. And, in consequence, many key operations are being maintained on what may be termed "temporary" setups pending arrival of special equipment.

Indicative of forward planning for mass production is the outstanding transfer machine installation for machining aluminum cylinder heads in an automatic cycle capable of finishing a cylinder head every 36 seconds. This Greenlee machine, the first of two units to be placed in operation, runs some 178 ft in length, and weighs 242 tons. It is composed of 101 stations—46 machining, 55 for transferring. And it has in action 141 cutting spindles for milling, drilling, chamfering, boring, reaming, spotfacing, and tapping. A total of 70 electric motors are installed to provide power for this unit. It also includes 116 gaging devices.

An installation of this size demands special attention to the handling of chips and cutting fluid to assure continuous and satisfactory operation. To this end, the unit is provided with an 11,000 gal coolant system, arranged for circulating coolant at the rate of 800 gpm. This coolant is pumped through a Delpark filtering unit. The filter structure occupies approximately 20 by 40 ft of floor space and has two independent sets of filtering units, one for each of the

two Greenlee transfer machines which it serves.

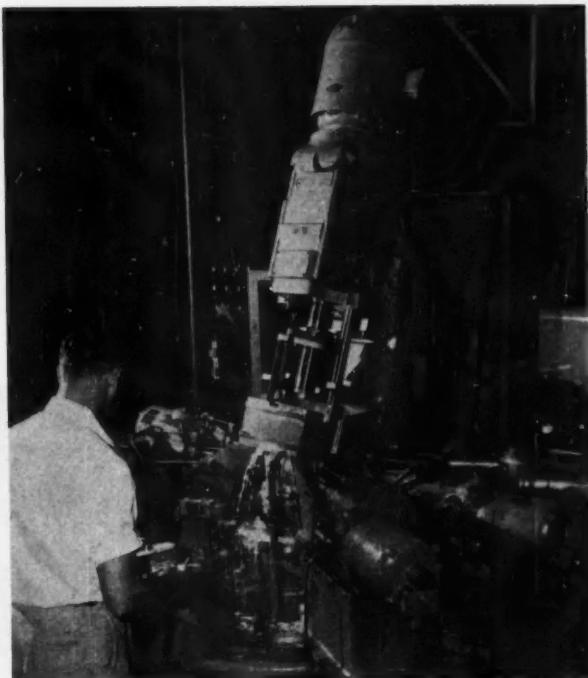
Apart from the enormous transfer equipment mentioned above, Michoud boasts a major installation of conveyors, hoists, and cranes, most of the conveyor systems being installed by J. B. Webb. A rather unique feature is an automatic A.C.P. Alodizing system for coating aluminum crankcase castings with a protective and paint-receptive chemical film.

Productive equipment abounds in familiar makes and types too numerous to mention, except as noted in connection with a sampling of machining operations to be described later. One of the major installations is an array of some 23 of the big Bullard Multi-Automatics tooled for a variety of operations.

In view of the nature of this facility, the present article will be confined to a sampling of interesting operations selected to provide the reader with a perspective of the general activity. For one example, consider pistons which are machined from the rough on a self-contained line. Illustrated here is one of the special Kingsbury multiple-head drilling units. It is tooled for drilling two banks of smoke holes—the upper row having six holes, the lower eight holes. In addition, two angularly located valve clearance recesses are bored in the head.

A special Avey drilling machine is designed for core-drilling and reaming piston pin holes in preparation for precision-boring in the Heald Bore-Matic.

Although each operation is inspected at the machine, final inspection of the completely machined piston takes place at the end of the line using the



Tank Engine Production Continued...

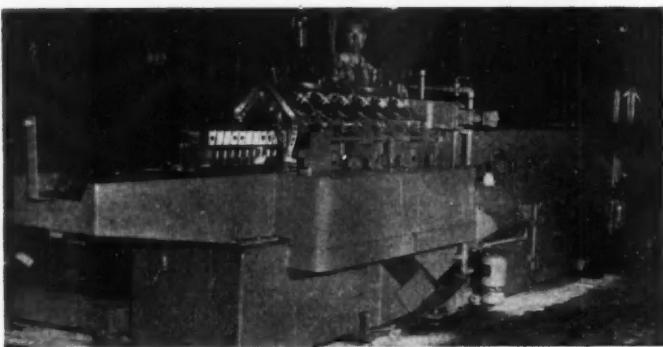
familiar Pratt & Whitney Air-O-Limit gage. This is a multiple checking gage, inspecting ring grooves, ring lands, pin bore, and skirt diameter. Piston pin bores, precision-bored in a Heald Bore-Matic, are held

to a total tolerance of 0.0002 in.; skirt diameter is held to a total tolerance of 0.001 in. Overall surface finish is specified as 25 micro-inch (rms); while the pin bore is held on the Heald to 15 micro-inch. Spot checking of surface finish is done with a portable Profilometer.

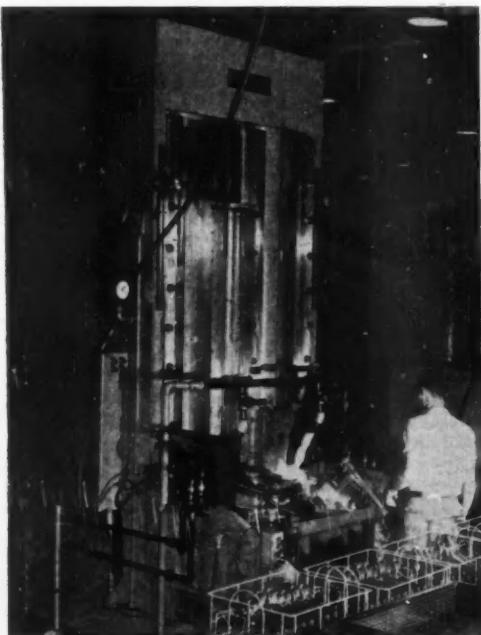
Naturally, the major machining job is found on the aluminum crankcase. Here they have a large battery of special single-purpose W. F. & John Barnes machines of way type for drilling and tapping; W. F. & John Barnes horizontal machines for boring the main bearing and camshaft bearing lines; and a double-end gun-drilling machine for the 52-in. long oil gallery.

A number of special Snyder machines are employed on this line, the one illustrated being a V-type unit for drilling, counterboring, and tapping the decks for cylinder barrel attachment. This machine has three heads on each side for progressively drilling, counterboring, and tapping, featuring a total of 168 spindles.

Both ends of the crankcase are milled to length in a spe-

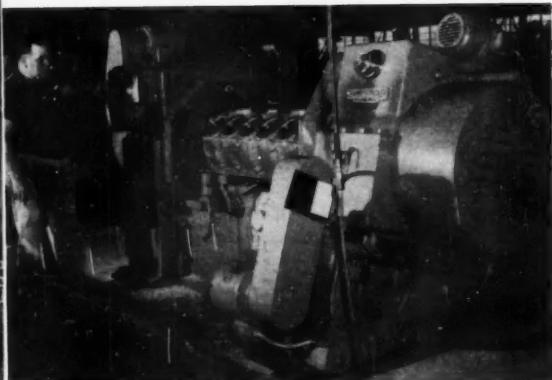


Broaching of the main bearing line and cross bolt faces of the crankcase is done in one pass in this horizontal Colonial surface broaching machine. The big broaching tool is composed of six sections, floor-to-floor time being about five minutes.



This vertical Lapointe surface broaching machine, one of a battery found in the connecting rod department, is one of the heaviest and most massive of the individual machine tools installed in this plant.

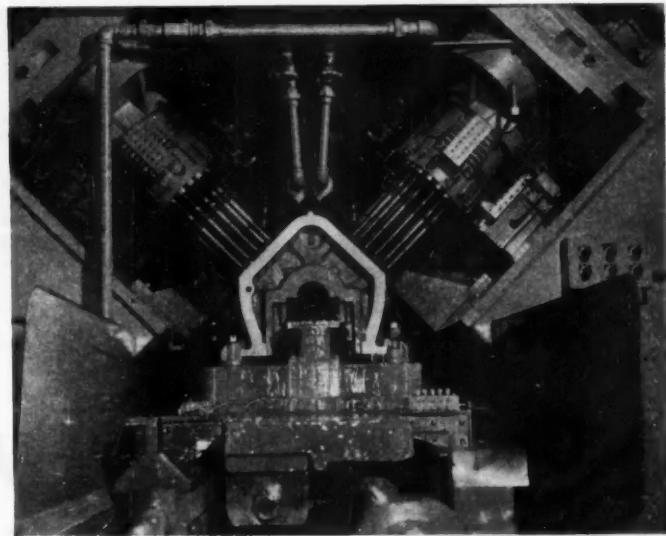
Here is a close-up of the Kearney & Trecker double-end planetary mill for finishing both ends of the crankcase.



cial Cincinnati Duplex type milling machine, fitted with a 24-in. diameter cutter on each side, with inserted tungsten-carbide blades. An unusual piece of equipment built for this line is the Kearney & Trecker double-end planetary mill, illustrated here. It takes the case after milling of the ends, and faces both ends to provide a finely finished surface for oil seals. The operation is extremely demanding as to flatness and squareness and surface finish since the joints are made up metal-to-metal without use of gaskets at assembly.

The main bearing line is rough- and finish-bored in a special W. F. & John Barnes horizontal boring machine, fitted with a massive boring bar capable of holding bores to a total tolerance of 0.0005 in. on diameter as well as accurately holding axial alignment. Bores and alignment are checked simultaneously with a Sheffield Precisionaire gage, using a long, massive checking bar which spans three main bearings at a time.

One of the final operations on the case is surface broaching in a big horizontal Colonial broaching machine. The broaching tool is designed to take the bearing cap sides as well as the faces for the through bolt bores, holding those surfaces to a total tolerance



View of the six-head Snyder special machine for drilling, counterboring, and tapping the decks for cylinder barrel attachment.

of 0.002 in. on dimensions as well as axial alignment.

After machining, the crankcase is processed through the Alodizing setup, which consists of a series of tanks running some 100 ft in length overall. This operation is completely automatic and conveyorized, and the sequence of stages along this line is as follows:

1. Immersion in cleaning solution, held at 140 to 150 F, for three to four min.
2. Cold water rinse, held at 60 to 80 F, for one min.
3. Alodine dip, held at 70 to 80 F, for three to four min.
4. Cold water rinse.
5. Hot water rinse, held at 170 to 180 F, for one to two min.

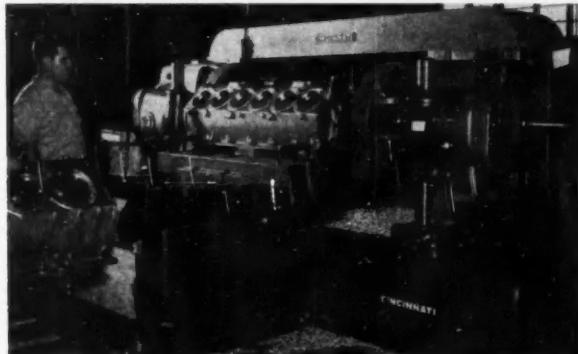
Pratt & Whitney horizontal gun drills are used for drilling the central oil hole through the camshaft—about 52 in. long. A battery of LaPointe vertical surface broaching machines is installed for various operations on the big end of connecting rods and caps. The large oil-pan casting is drilled and tapped in a number of Bausch multiple spindle machines, the largest unit handling 60 holes in a single setting.

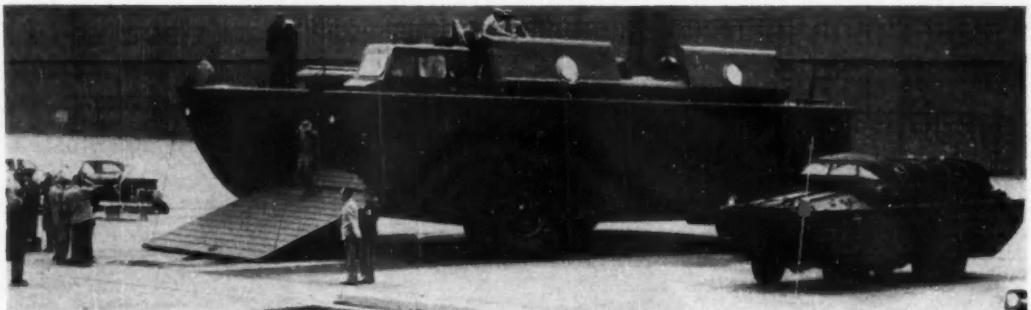
Mention was made earlier of the intensive mechanization to which this facility has been treated. It concludes many miles of conveyors of various types as outlined briefly below, much of the installation having been made by J. B. Webb of Detroit:

| | |
|--|-----------|
| Merry-go-round system of floor conveyors for final engine assembly—Webb Towveyors | 5,000 ft |
| Overhead monorail conveyors | 27,000 ft |
| Carry-all system of overhead conveyors—for transporting miscellaneous aluminum parts to the final assembly lines and spare parts for packing | 4,700 ft |
| Logan gravity roller conveyors | 10,000 ft |
| Belt conveyor sections | 4,000 ft |

In addition, the materials handling equipment includes some 550 hoists.

Both ends of the crankcase are rough-milled in one pass in this massive Cincinnati Duplex mill, fitted with 24-in. diameter milling cutters at each end.





A World War II DUKW alongside the BARC gives a comparison of size and shape.

Huge Amphibious Vehicle

Has One Engine per Wheel

General Specifications

| | |
|------------------------------------|--------------|
| Overall length | 61 ft. |
| Overall width | 26 ft. |
| Overall height | 16 ft. |
| Height, cab removed | 14 ft. 3 in. |
| Wheelbase | 28 ft. 9 in. |
| Cargo Space: | |
| Length | 36 ft. |
| Width | 14 ft. |
| Height | 5½ ft. |
| Payload: | |
| Normal | 60 tons |
| Maximum emergency | 100 tons |
| Weight of BARC and fuel | 197,000 lb. |
| Minimum turning radius | 75 ft. |
| Clearance under hull (60 ton load) | 2 ft. 4 in. |
| Approach and departure angle | 30 deg. |
| Maximum land speeds: | |
| Empty | 15 mph |
| 60 ton load | 10 mph |
| Maximum water speeds: | |
| Empty | 7.3 mph |
| 60 ton load | 6.8 mph |
| Draft: | |
| Light | 3 ft. |
| 60 ton load | 4 ft. 7 in. |
| 100 ton load | 5 ft. 7 in. |



The BARC makes a turn onto the highway leaving the factory, on its way to the Boeing Renton plant and testing in Lake Washington.

A **HUGE** amphibious cargo vehicle, the BARC, recently demonstrated to the press, was conceived and built in 13 months. In August, 1951, the Army Transportation Corps began a study to determine the feasibility and design of such a vehicle. A detailed design and prototype construction contract was let to the Pacific Car and Foundry Co., Renton, Wash., in December, 1951.

In the early stages of design, PC&F subcontracted the design of major components to other firms: W. C. Nickum and Sons of Seattle, hull and marine components; Kenworth Motor Truck Co., Seattle, wheel and land components; Western Gear Works, Seattle, design of the main transmission gearing for both land and water operations. United States Steel Co. supplied the hull steel.

Though the present prototype model was designed to use the largest number of commercially available parts, most components had to be specifically designed for the vehicle due to its size. Companies which were engaged in this design work included the Industrial Products Div. of the Westinghouse Airbrake Co., the Fawick Airflex Co. and the Century Metals Co., Seattle.

The BARC first moved under its own power when it rolled off the building ways at the Renton plant of PC&F on Sept. 22, 1952. It moves overland on four 9½-ft high pneumatic tires, size (Turn to page 98, please)

News of the MACHINERY INDUSTRIES

By Thomas Mac New

NMTBA Fall Meeting

Last month in White Sulphur Springs, W. Va., the National Machine Tool Builders' Association held its annual Fall Meeting with over 300 members in attendance. As reported in this column, AUTOMOTIVE INDUSTRIES, December 1, Swan E. Bergstrom, vice president, Cincinnati Milling Machine Co., was elected president of the NMTBA.

Frederick S. Blackall, Jr., president, Taft-Pierce Manufacturing Co., in his final address as the 1952 president of the association, pointed out that a program of progressive decontrol of the machine tool industry as rapidly as circumstances warrant, is the surest way to strengthen the machine tool industry. He went on to say that the industry has willingly borne the yoke of the managed economy, accepting controls, restrictions, and regulations because a national emergency existed. Mr. Blackall said, "To meet the challenge which faces us at home and abroad, this industry must be strong and aggressive, and that means that, above all, it must be competitive."

The machine tool industry is not looking for Government subsidies but rather for sound legislation relating to the amortization of machine tools for tax purposes, according to Mr. Blackall. What the industry needs is recognition, in taxation and renegotiation, of the highly cyclical character of its business, so that it may be permitted, during periodic bursts of feverish activity, to accumulate reserves without penalty, which will carry it through the inevitable droughts which always follow, he went on to say.

Mr. Blackall further stated, "We do want the opportunity to face and meet competition wherever it exists, confident that its stimulus will strengthen rather than weaken us, and, incidentally, make us a more effective instrument of the national defense."

Controls

A report on "Control versus Decontrol," which was prepared by M. A.

Hollengreen, president, Landis Tool Co., was read by E. W. Miller, president, Fellows Gear Shaper Co., due to the absence of Mr. Hollengreen at the meeting because of illness. In this address it was stated that we cannot rely upon an immediate and extraordinary expansion of the machine tool industry, because of the nature of our products and because it is not possible for the Defense Department, when the emergency comes, to tell us what they expect us to do. According to Mr. Hollengreen's report, the obvious necessity is to set up a series of procedures that will be put into effect in the event of war. The Nation needs to have, in conjunction with, and as a part of, each of the metal-working plants that produce our civilian needs, a department which would supplement the machine tools already in that plant. The purpose of this department would be to enable the plant, with its existing administrative officers, engineers, and workers, to begin overnight the production of some weapon that would be needed in a substantial quantity, it was reported.

By proxy, Mr. Hollengreen stated, "It now seems to be more widely understood in Washington that the purpose of our present program should be to develop such capacity for the production of weapons in large quantities, rather than to expend our resources in the manufacture of the weapons themselves. It follows that the Defense Department must have a definite list of the weapons it thinks it will need in the event of war. It is then possible to build up the machine tool industry in an orderly fashion, over a period of years, to meet this need."

No Renegotiation in 1953

Speaking on renegotiation, A. G. Bryant, vice-president, Cleerman Machine Tool Co., contended that the probability of greatly reduced shipments beginning in 1953, the influx of foreign machine tools, and the prospect of a saturated market in the future, are the most important factors in machine tool producers re-

Decontrol, Renegotiation, and Building of "Shadow" Plants Analyzed at Annual Fall Meeting of NMTBA

negotiation proceedings. "The peak of emergency production of machine tools is about to pass," said Mr. Bryant. "The peak will be thinner and sharper than it was during World War II, and it will be reflected mainly in 1952 sales and profits. The industry is earning in 1951 and 1952 the profits that would normally be spread over several years, and those profits are being concentrated into a period of high excess profits taxes, price ceilings and renegotiation."

It is clear, according to Mr. Bryant, that the manufacture of critical machine tools was slowed down at the start of the present defense program partly because the industry had been weakened by the unwise renegotiation procedure of World War II. He pointed out that in a mixed civilian and defense economy, and particularly with the downturn in machine tool volume, there would be no need for renegotiation in 1953 to protect procurement on so-called "collateral items," such as machine tools which are not military end products.

Shadow Plants

The Government should consider the advisability of building so-called "shadow" plants for producing specific military end items instead of adopting any enlarged program for the stockpiling of Government-owned tools, Ralph S. Howe, director, Metalworking Equipment Div., NPA, stated in his address before the machine tool builders. He claimed that a shadow plant program is favored by the tool builders. Shadow plant facilities would be continually kept up to date by taking advantage of technological improvements as they develop.

Mr. Howe commented that the current problem of both industry and Government is to find sufficient business from all sources—rated or unrated, domestic or foreign—to keep the machine tool industry operating at a safe level. He advocated establishing productive capacity rather than creating large inventories of finished military goods.

(Turn to page 108, please)

NEW

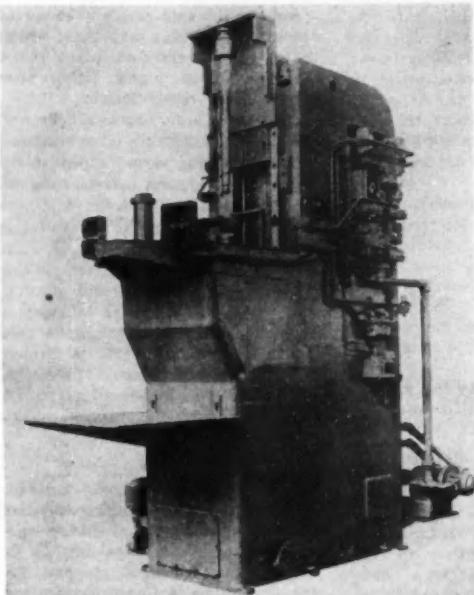
EQUIPMENT

PLANT • PRODUCTION



FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

Pull-Down Broaching Machine for Defense Work

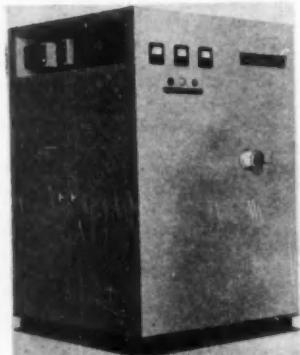


American pull-down broaching machine.

Designed for defense production work, a pull-down broaching machine has been recently completed for a manufacturer of tank parts. The machines are equipped with interchangeable base fixtures and tooling for broaching the round and serrated holes in seven different tank arm and spindle parts.

Inherent stability is claimed to have been built into the machine by having the machine slide and retriever slide move on the same ways. The retriever guides the rear end of the broach down through the major portion of the cutting stroke. With the broach held securely at both ends during most of the cutting stroke, misalignment and vibration is said to be minimized. An electrical interlock between the retriever and machine cycle automatically stops the cycle if, by any chance, the pull head should fail to connect with the broach. The hydraulic receding work slide, which is also interlocked to the machine cycle, facilitates loading and increases productivity. *American Broach.*

Circle E-1 on page 65 for more data



Westinghouse 25-kw r-f generator.

25-Kw R-F Generator

A 25-kw radio-frequency generator is available in two models. The standard model is for use on relatively long production runs where readjustment of the r-f generator will be infrequent; taps on the plate transformer provide power output control. The deluxe model uses saturable reactors to provide stepless power control, for making set-up changes as required on short production runs of a variety of jobs. An electronic keying circuit is also included on the deluxe model to permit control of heat cycles.

The unit is rated at 25 kw continuous at 450 kc in accordance with NEMA standards. The tank circuit has a high kva rating. Filament voltage is controlled to ± 3 per cent. The unit features a built in closed circuit water cooling system, using distilled water, with a water-to-water heat exchanger. Complete protection is provided against condensation and water impurities with minimum raw water consumption. *Westinghouse Electric Corp.*

Circle E-2 on page 65 for more data

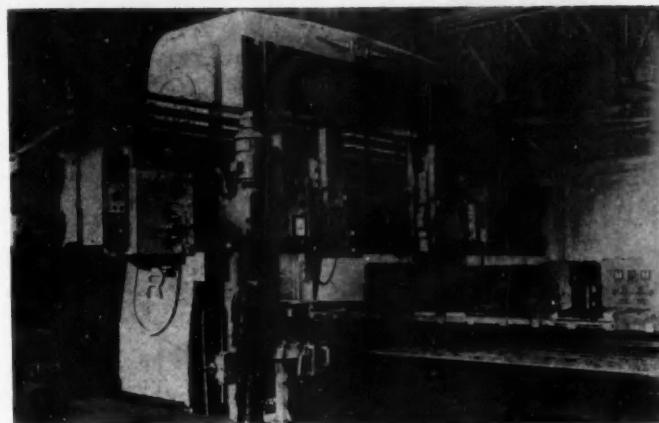
Versatile Double-Column Planer for Large Workpieces

Transverse, vertical, bevel and longitudinal planing operations in the toolroom can all be carried out with a single set-up on work pieces as large as 171-in. wide by 110-in. high by 394-in. long, through the use of the Wagner double-column planer. Other operations possible with the same set-up include vertical and bevel slotting, longitudinal and transverse milling.

The adaptability of the Wagner planer to this wide variety of machining operations without re-alignment of the work piece is claimed to reduce the cost of setting up heavy, bulky pieces. On the Wagner planer, the left-hand cross rail head has an infinitely variable drive for feeding it along the cross rail, permitting transverse planing with the original set-up with the longitudinal movement immobilized.

For further savings in setting-up time, the table is divided longitudinally into two sections with independent travel. While one piece is being machined on the section of the table under the cross rail, a second piece can be set up on the stationary section of the table.

All motions are push-button controlled from a central point. In addition to the central control, provision is made, by electromagnetic-mechanical



Orban distributed Wagner double-column planer.

devices, for portable push-button control of horizontal and vertical motions of feed, rapid traverse and precision approach (the last with movements as short as 0.0004-in.). Tool heads on cross rail and on side column have independent power drives. Illuminated windows with arrows, showing direction of feed, permit checking of

movements from a distance. Gear drive for the table has been located to permit heavy ribbing of the bed and columns. Drive location also allows the use of a shorter gear drive.

Beds ways are ground, after bed has been set up, to a tolerance of 0.001-in. per 80 ft. *Kurt Orban Co., Inc.*

Circle E-3 on page 65 for more data



Ex-Cell-O precision tool grinder.

Precision Tool Grinder

Now being built is a precision tool grinder known as Style 44-A. This model, using six-in. cup type wheels, is said to sharpen any of the modern tool materials such as sintered carbides, cast alloys and high-speed steels. It is especially suitable for grinding carbide with diamond wheels according to the maker. It is capable of sharpening all sizes of boring, turning and facing tools up to $\frac{1}{8}$ -in. square or equal cross-sectional area.

Features include a heavy steel base which has ample height for operator convenience, large U-shaped tool rest tables rigidly supported, and hardened steel wear plates. The tables can be tilted to the angle required—adjustment is shown in scale which reads in degrees. A coolant tank is located in the base with a large clean-out and drain opening positioned for easy maintenance. *Ex-Cell-O Corp.*

Circle E-4 on page 65 for more data

(Turn to page 58, please)

NEW

EQUIPMENT

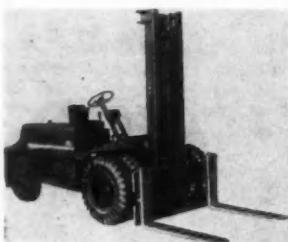


For additional information, please use postage-free reply card on page 65

(Continued from page 57)

10,000 lb Fork Truck

Yardlift-100, the latest addition to a line of fork-lift trucks, is a gas-powered, pneumatic-tired truck which



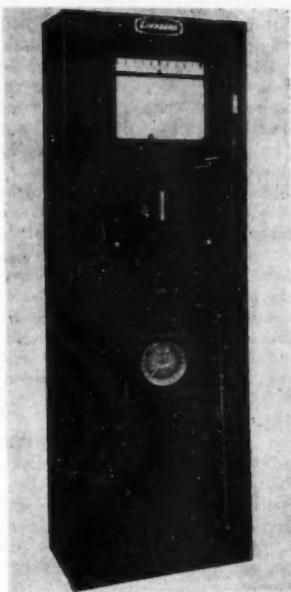
Clark, Yardlift-100.

has a 10,000-lb capacity at 24-in. load center and is designed for heavy-duty high-tiering.

The Yardlift-100 is powered by a Continental engine producing 55 bhp at 2000 rpm and a traveling speed of 17.8 mph. It has a 133 in. turning radius. Hydraulic steering is standard, and with the "no-kick-back" axle, is said to provide maximum operating ease. In case of motor stoppage, steering can be accomplished manually. Standard overall height is 113 in. with fork lowered, and 178 in. maximum with forks raised to 144 in. *Clark Equipment Co.*

Circle E-5 on page 65 for more data

Automatic Control of Furnace Atmospheres



Data has been released on a device to automatically control and record the carbon potential of furnace atmosphere. Called Carboret, it is a proportioning instrument which enables the heat treater to set his atmosphere or furnace in equilibrium with any steel. (Lindberg Engineering Co.)

Circle E-7 on page 65 for more data

Semi-Portable Degreaser

Designed to clean small and medium sized parts, Model VS Jr. degreaser is said to be suited for shops, laboratories and small manufacturing plants where production up to 600 lb of steel per hr must be degreased.

Two standard, manually operated models of the VS Jr. are available. One is electrically heated, the other operates by steam.

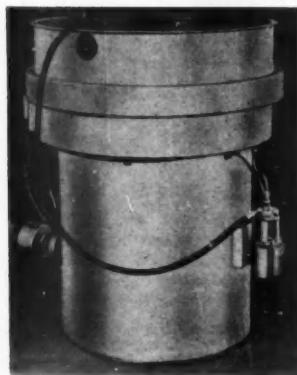
Parts are suspended in pure solvent vapor which dissolves soils of dirt and grease. A spray of hot solvent flushes away any loose soils which might remain. Finally, a rinse in pure solvent vapor leaves the work thoroughly clean and dry.

All work may be placed in baskets or on racks or hooks for handling. Work may be carried in and out of a degreaser either by hand or a small hoist. The equipment is 48 in. from the top to the base.

The interior of the equipment is coated with a non-porous coating

which is corrosion-proof and unaffected by degreasing solvents. *Detrex Corp.*

Circle E-6 on page 65 for more data



Detrex semi-portable degreaser.

Cold Cabinets for Production Chilling

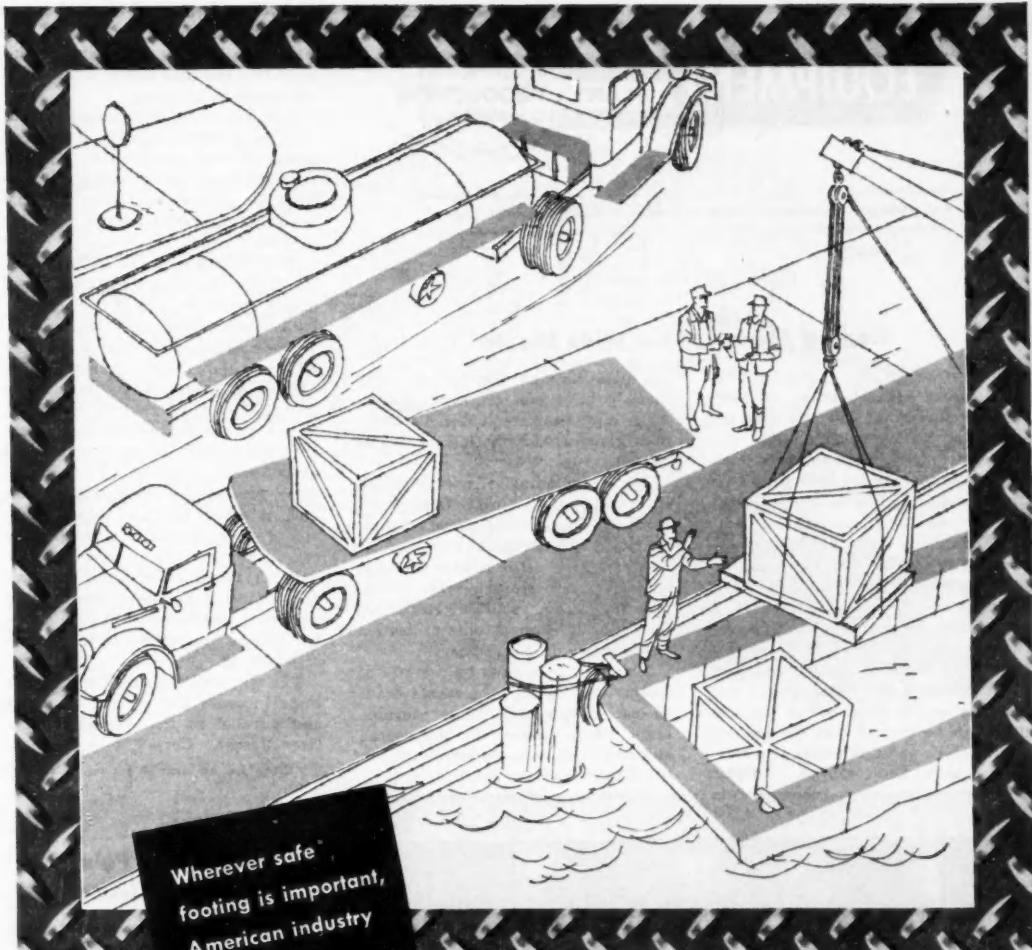
The introduction of a series of cold cabinets has been announced. Designated XV 120, they are engineered to obtain temperatures of 140 deg below zero for small-scale production chilling.

Various sizes of chilling chambers are available from 1.5 to three cu ft. Controlled temperature range is from -70 F to -140 F. Heat absorption capacity is 250 btu per hr at -120 F, normal operating temperature.

Occupying approximately seven sq ft of floor space, the unit uses two hermetically sealed motor-compressor assemblies of $\frac{1}{4}$ hp and $\frac{1}{2}$ hp. Special design eliminates moisture condensation and keeps the exterior of the cabinet dry in any climate, according to the maker. *Sub-Zero Products Co.*

Circle E-8 on page 65 for more data

(Turn to page 60, please)



INLAND 4-WAY SAFETY PLATE

Because ACCIDENTS are COSTLY, safe, sure footing pays off in higher production, better fire protection and lower insurance rates.

Men "on the move" appreciate the non-skid, slip-resistant qualities of Inland 4-Way Safety Plate. They work faster and more efficiently; morale is generally higher.

The long-lasting qualities of Inland 4-Way Safety Plate means lower maintenance and replacement costs —fewer repairs.

You'll be wise to use Inland 4-Way Safety Plate on all danger spots in your plant and as standard equipment for your products. It's a worthwhile investment any way you look at it.

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INLAND

NEW EQUIPMENT



For additional information, please use postage-free reply card on page 65

(Continued from page 58)

Coated Abrasives for Wide Sheets

A surface grinder called the Curtin-Herbert Micro-Grinder, is being manufactured that will face wide web sheets of leather, plastic, felt, cork, rubber or metal, maintaining a thickness tolerance of ± 0.0005 in. on the finished stock. Developed by Curtin-Herbert Co., in co-operation with Behr-Manning Corp., the machine is claimed to produce this degree of accuracy through the use of a coated abrasive cover, spiral wound on a cast iron back-up roll. Machine widths range from 12 to 80 in. but widths of 40 to 52 in. are standard.

Accuracy of the finish-ground web depends on the hardness of the material to be ground and the amount of the stock to be removed. On relatively soft non-metallics, 0.0625 ± 0.0005 in. of stock can be removed in

one pass through the grinder. Extremely hard non-metallics, such as mica and laminated phenolic, have been given a 0.030 ± 0.0005 in. cut at one pass.

The coated abrasive cover is spirally wound around a centrifugally-cast normalized cast iron drum that is machined to a tolerance of ± 0.0005 in. The edges of the coated abrasive cover do not overlap but are butted together. This mounting technique for the drum cover permits utilization of the entire drum periphery.

The cover is secured by a series of clamps that fasten to movable heads on each drum end. These movable heads exert tension on the coated abrasive drum cover outwardly and in the direction of the spiral.

Either an oscillating or non-oscil-

lating type drum can be used on the grinder. The grinding drum is completely enclosed and an exhaust duct built into the hood removes the swarf generated by grinding.

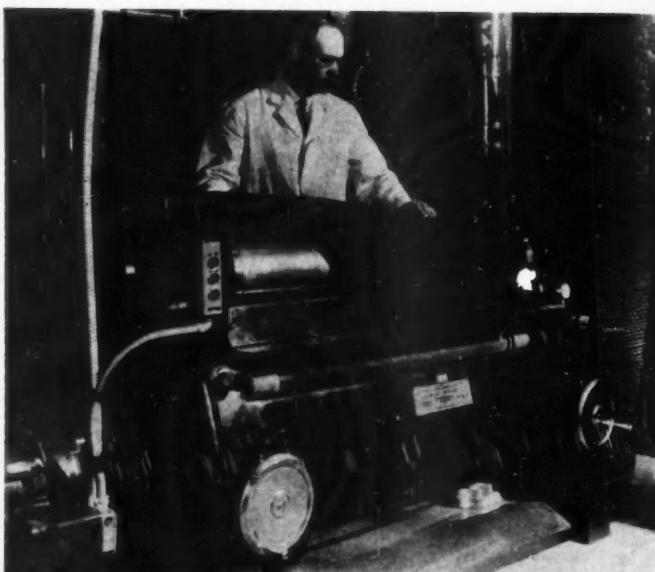
The web stock to be ground is fed into the grinding area by a series of rubber-covered pinch rolls. Mounted directly under the grinding roll is a precision ground steel billy roll that supports the stock as it is being ground.

This billy roll may be adjusted vertically by two handwheels positioned on the operator's side of the machine. Either handwheel will actuate the worms and gears that move the billy roll up to the grinding drum. Moving either handwheel a full revolution will raise or lower the billy roll 0.005 in. A powered elevating mechanism with limit switches can be installed as optional equipment. A dial indicator, graduated in thousandths of an inch, is set on the feed table to provide a visual means of adjusting the cut.

For making adjustments that are finer than can be made with the dial indicator, graduated collars on the handwheels are marked in increments of 0.0001 in.

The billy roll is ground in the machine in order that it will be round and parallel to the grinding drum. *Behr-Manning Corp.*

Circle E-9 on page 65 for more data



Coated abrasive cover being spiral wound onto the cast iron roll. Note that the seams are butted together and are not overlapped. The two large handwheels regulate the thickness of cut as measured by the dial indicator (right center).

High Flash Point Emulsion Cleaner

Pennsalt EC-54, an emulsion cleaner, has been developed for metal cleaning. EC-54 is said to clean non-ferrous metals without tarnishing and will protect ferrous parts from in-plant rusting. An emulsifiable liquid, it has a flash point of 260 F, a fire point of 300 F, and 95 per cent boils within a range of 500 to 600 F. Its flash point is well above temperatures normally used in emulsion spray cleaning.

Ferrous parts cleaned with EC-54 are claimed to be protected against in-plant rusting for a period of one to six weeks. This period can be lengthened by the use of stronger solutions and by omission of the rinse following the cleaning stage.

On non-ferrous metals, it will not tarnish aluminum, magnesium, brass or zinc. One cleaning unit can be used to process all metals in a given plant. *Pennsylvania Salt Mfg. Co.*

Circle E-10 on page 65 for more data

(Turn to page 62, please)

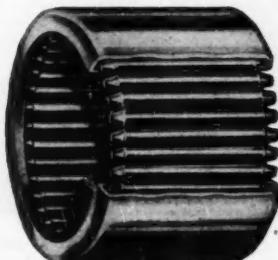


tight quarters are no problem

Torrington Needle Bearings have smaller OD in relation to rated radial load capacity than any other type of anti-friction bearings.

In many products, compact Needle Bearings allow reductions in size and weight of housings and related assemblies. In others, they permit the use of larger, stronger shafts without increasing housing bores.

Whatever your space problem, it will pay you to investigate the combination of high capacity and small OD offered by Torrington Needle Bearings. Our engineers will be glad to assist you.



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AUTOMOTIVE INDUSTRIES, December 15, 1952

NEW**EQUIPMENT**

For additional information, please use postage-free reply card on page 65

(Continued from page 60)

Automatic Boring Unit

The recently released 3B boring unit is basically a fixed center horizontal boring mill with automatic cycle containing the following specifications:

| | |
|------------------------------|---------------------------------|
| Horsepower | 5 to 10 |
| Spindle speed | 33 to 500 rpm by pick off gears |
| Diameter of spindle | 3" |
| Morse taper of spindle | 25 |
| Length of bar stroke | 10" |

The boring unit body is a box ribbed semi-steel casting. A hardened high alloy steel spindle reciprocates through hardened steel bushings mounted in the sleeve. The sleeve is contained at the forward end in two Timken bearings and the rear mounted third bearing is permitted to float. Spindle reduction drive is full ball bearing mounted with ample gear tooth design and the final drive is through helical gears.

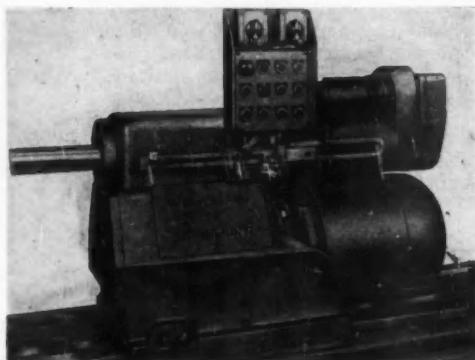
Feed mechanism is operated by means of a hydraulic pump and fluid motor. The fluid motor drives through a gear reduction to the lead screw which in turn feeds the lead nut mounted in ball bearings on the end of the spindle.

A system of valves and piping allows cycle adjustments within the range specified. The pump is a two pressure system incorporating auto-

matic unloading valves, and is mounted on a tank apart from the machine. The fluid motor is a multiple piston rotary type of constant displacement.

Lubrication of spindle reduction and bearings is maintained from a pressure system operating in a reservoir in the main casting.

Changes of feed during the automatic cycle are controlled by means



Millholland automatic boring unit.



cision ground taps, thread plug gages, micrometer spindles, elevating and adjusting screws used in precision instruments and many other components. This machine tool may be equipped with Sheffield Crushtrue dressing equipment, which makes it adaptable for the grinding of some small and intricate forms. *The Sheffield Corp.*

Circle E-12 on page 65 for more data

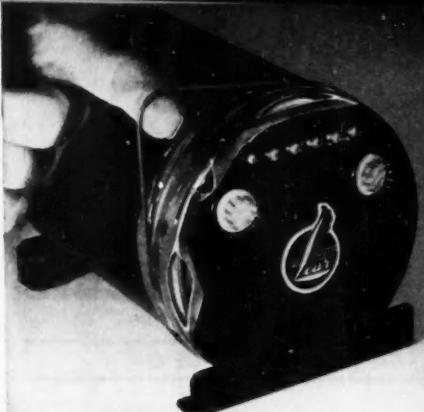
of adjustable dogs contacting limit switches. However, the positive stop switch need only be adjusted within $\frac{1}{4}$ in. of accuracy because this contact actuates a solenoid which in turn permits a rotary stop mounted on the lead screw to function. The rotary positive stop is adjustable in approximately 0.001 increments. *W. K. Millholland Machinery Co.*

Circle E-11 on page 65 for more data

Precision Thread Grinder

Now on the market is a small precision thread grinder specifically designed to handle threads 20 pitch and finer. Finest pitch recommended is 124 on a U. S. form, although finer pitches can be ground in the Whitworth form. The machine will handle work up to $\frac{1}{2}$ -in. diam and four-in. between centers. It employs a multi-rim wheel.

The lead screw is driven through change gears. It is recommended for producing close tolerance fine pitch threads, such as those found on pre-



Courtesy Lear, Inc.



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SILASTIC® works

where other materials fail

To assure maximum service life and accuracy, engineers at Lear, Incorporated, planned to protect their new vertical gyro-mechanism from corrosion by housing it in a completely inert and dehydrated atmosphere.

Sealing the housing, however, proved to be more easily said than done. Despite the most elaborate precautions, solder and flux fumes often penetrated the joint and contaminated the delicate mechanism. Once sealed, it was impossible to reopen the case without loss of the expensive cover and harness.

To both of these problems a simple and ingenious solution was found. A thin O-ring of Silastic molded to fit snugly under the cover flange is used to exclude the

corrosive fumes generated in soldering a metal strip over the entire joint. The Dow Corning silicone rubber O-ring is not damaged by soldering temperatures. And, the gyro-mechanism is just as accessible for repairs as the contents of a hermetically sealed can of coffee. Lear also uses a large ring washer of Silastic at each end of the housing to serve as resilient, shock-absorbing cushions for the apparatus at stratospheric temperatures.

And that's just one of hundreds of examples of how Silastic is used to improve the performance of products ranging from cable to traction motors, from domestic steam irons to aircraft.

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Switch for Signaling Air Pressure Drop



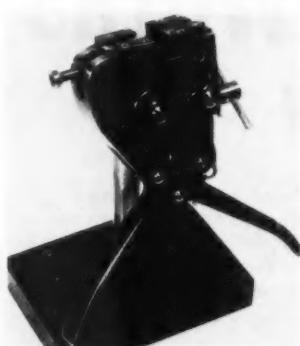
Now in production is a pressure switch for sounding a buzzer or other signal when air pressure in a tank falls below the safety level. It is intended primarily to serve as a warning signal on buses and trucks having air brakes, to demand the driver's attention if the air pressure drops dangerously.

The principal part of the switch is a pressure-sensitive diaphragm, enclosed in a one-piece steel case drawn from 0.050 terneplate. The case is 1 1/2 in. in diameter, and 1 1/4 in. front to back, including terminals and the

stem which screws into the air receiver tank housing or into the air line from the receiver.

In operation, the diaphragm, through a rocker action linkage, completes an electrical circuit whenever the air pressure in the air receiver tank drops below the predetermined safety point—usually about 60 lb. At that point a pressure difference of not more than half a pound actuates the switch. In most installations the switch activates a loud buzzer. *Rochester Manufacturing Co.*

Circle P-5 on page 65 for more data



Device for Welding Non-Ferrous Metals

Recently announced is a device that is said to weld non-ferrous metals such as aluminum and copper without heat, flame, or electrical current, and without acids, fluxes, or chemicals. For example, it is claimed that butt-welding of wires may be accomplished merely by inserting the two ends into a small unit and squeezing plier-like handles.

Using a process originating in England and developed by Koldweld Corp. in the U. S., the metal is said to be actually work-hardened in the device. Wire can be drawn after the

weld is made, and tensile strength tests reportedly show that it will ultimately part at some point remote from the weld before the weld itself will fail. It is also claimed that the Koldweld is such that after removal of the small flash of metal at the bond, the connection is the same gauge as the wire itself.

The Koldweld process reportedly can also be used in joining flat sheets of non-ferrous metals. The bond is said to be made solely by pressure. *Utica Drop Forge & Tool Corp.*

Circle P-6 on page 65 for more data



Brake Fluid Level Indicator

Designed to forewarn motorists of impending brake failures, caused by deficient brake fluid or line leakage, a hydraulic brake fluid level indicator is now being marketed.

Known as Ever-Safe the unit reportedly can be quickly installed on any make car, truck, or tractor. The device consists of a float mechanism which replaces the master cylinder plug. The float plunger rod operates an electrical contact, closing a circuit when brake fluid in master cylinder reaches a minimum safe level.

A red warning light on the dash is

instantly turned on to warn the driver to have fluid added and lines checked for possible leaks. Electrical connections are made at the ignition switch, so that the unit is automatically in operation whenever switch is on.

According to the manufacturer, safety and brake experts claim that the protection offered by the device will substantially reduce the high percentage of accidents attributed to brake failures. *General Metal Products Corp.*

Circle P-7 on page 65 for more data
(Turn to page 94, please)

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"O" Ring Packings

Catalog No. 700 features detailed data on Victoprene "O" ring packings. Designs, specifications, and applications are all included. Victor Mfg. & Gasket Co.

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Plastic Parts

Now available is a four-page leaflet covering a wide selection of stock molded plastic parts furnished without tooling cost. Dimeo-Grey Co.

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Blast Cleaning

Recently released is a booklet which describes a line of small units for blast cleaning and dust collection applications. Pangborn Corp.

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Machine Tools

Catalog No. 27812 shows in a condensed form virtually all the manufacturer's machine tools and other products. Ex-Cell-O Corp.

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Control Relay

Recently released is a folder on the new Type N control relay. The 10-amp, 600-v. a-c unit is designed for use with pilot circuits, automatic controls, and sequencing operations. Westinghouse Electric Corp.

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Industrial Laminates

Currently available is a brochure covering Textelite industrial laminates. Full specification and application data are given in convenient chart form. Chemical Div., General Electric Co.

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Grinding Wheels

Fresh off the press is a booklet entitled "A New Concept in Grinding Wheels." Valuable information on grinding in general and a picture story on the making of the manufacturer's products are included. The Cincinnati Milling Machine Co.

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Balancing Machines

Currently available is an eight-page brochure describing the Trebel line of dynamic and static balancing machines. Operational principles are covered in detail. Kurt Orban Co., Inc.

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(Please turn page)

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12/18/62

| NEW PRODUCTION & PLANT EQUIPMENT | |
|----------------------------------|--------|
| E-1 | P-13 |
| E-2 | P-18 |
| E-3 | P-25 |
| E-4 | P-30 |
| E-5 | P-39 |
| E-6 | P-41 |
| E-7 | P-47 |
| E-8 | P-57 |
| E-9 | P-62 |
| E-10 | P-68 |
| E-11 | P-72 |
| E-12 | P-77 |
| E-13 | P-82 |
| E-14 | P-86 |
| E-15 | P-91 |
| E-16 | P-97 |
| E-17 | P-102 |
| E-18 | P-108 |
| E-19 | P-113 |
| E-20 | P-118 |
| E-21 | P-123 |
| E-22 | P-128 |
| E-23 | P-133 |
| E-24 | P-138 |
| E-25 | P-143 |
| E-26 | P-148 |
| E-27 | P-153 |
| E-28 | P-158 |
| E-29 | P-163 |
| E-30 | P-168 |
| E-31 | P-173 |
| E-32 | P-178 |
| E-33 | P-183 |
| E-34 | P-188 |
| E-35 | P-193 |
| E-36 | P-198 |
| E-37 | P-203 |
| E-38 | P-208 |
| E-39 | P-213 |
| E-40 | P-218 |
| E-41 | P-223 |
| E-42 | P-228 |
| E-43 | P-233 |
| E-44 | P-238 |
| E-45 | P-243 |
| E-46 | P-248 |
| E-47 | P-253 |
| E-48 | P-258 |
| E-49 | P-263 |
| E-50 | P-268 |
| E-51 | P-273 |
| E-52 | P-278 |
| E-53 | P-283 |
| E-54 | P-288 |
| E-55 | P-293 |
| E-56 | P-298 |
| E-57 | P-303 |
| E-58 | P-308 |
| E-59 | P-313 |
| E-60 | P-318 |
| E-61 | P-323 |
| E-62 | P-328 |
| E-63 | P-333 |
| E-64 | P-338 |
| E-65 | P-343 |
| E-66 | P-348 |
| E-67 | P-353 |
| E-68 | P-358 |
| E-69 | P-363 |
| E-70 | P-368 |
| E-71 | P-373 |
| E-72 | P-378 |
| E-73 | P-383 |
| E-74 | P-388 |
| E-75 | P-393 |
| E-76 | P-398 |
| E-77 | P-403 |
| E-78 | P-408 |
| E-79 | P-413 |
| E-80 | P-418 |
| E-81 | P-423 |
| E-82 | P-428 |
| E-83 | P-433 |
| E-84 | P-438 |
| E-85 | P-443 |
| E-86 | P-448 |
| E-87 | P-453 |
| E-88 | P-458 |
| E-89 | P-463 |
| E-90 | P-468 |
| E-91 | P-473 |
| E-92 | P-478 |
| E-93 | P-483 |
| E-94 | P-488 |
| E-95 | P-493 |
| E-96 | P-498 |
| E-97 | P-503 |
| E-98 | P-508 |
| E-99 | P-513 |
| E-100 | P-518 |
| E-101 | P-523 |
| E-102 | P-528 |
| E-103 | P-533 |
| E-104 | P-538 |
| E-105 | P-543 |
| E-106 | P-548 |
| E-107 | P-553 |
| E-108 | P-558 |
| E-109 | P-563 |
| E-110 | P-568 |
| E-111 | P-573 |
| E-112 | P-578 |
| E-113 | P-583 |
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| E-115 | P-593 |
| E-116 | P-598 |
| E-117 | P-603 |
| E-118 | P-608 |
| E-119 | P-613 |
| E-120 | P-618 |
| E-121 | P-623 |
| E-122 | P-628 |
| E-123 | P-633 |
| E-124 | P-638 |
| E-125 | P-643 |
| E-126 | P-648 |
| E-127 | P-653 |
| E-128 | P-658 |
| E-129 | P-663 |
| E-130 | P-668 |
| E-131 | P-673 |
| E-132 | P-678 |
| E-133 | P-683 |
| E-134 | P-688 |
| E-135 | P-693 |
| E-136 | P-698 |
| E-137 | P-703 |
| E-138 | P-708 |
| E-139 | P-713 |
| E-140 | P-718 |
| E-141 | P-723 |
| E-142 | P-728 |
| E-143 | P-733 |
| E-144 | P-738 |
| E-145 | P-743 |
| E-146 | P-748 |
| E-147 | P-753 |
| E-148 | P-758 |
| E-149 | P-763 |
| E-150 | P-768 |
| E-151 | P-773 |
| E-152 | P-778 |
| E-153 | P-783 |
| E-154 | P-788 |
| E-155 | P-793 |
| E-156 | P-798 |
| E-157 | P-803 |
| E-158 | P-808 |
| E-159 | P-813 |
| E-160 | P-818 |
| E-161 | P-823 |
| E-162 | P-828 |
| E-163 | P-833 |
| E-164 | P-838 |
| E-165 | P-843 |
| E-166 | P-848 |
| E-167 | P-853 |
| E-168 | P-858 |
| E-169 | P-863 |
| E-170 | P-868 |
| E-171 | P-873 |
| E-172 | P-878 |
| E-173 | P-883 |
| E-174 | P-888 |
| E-175 | P-893 |
| E-176 | P-898 |
| E-177 | P-903 |
| E-178 | P-908 |
| E-179 | P-913 |
| E-180 | P-918 |
| E-181 | P-923 |
| E-182 | P-928 |
| E-183 | P-933 |
| E-184 | P-938 |
| E-185 | P-943 |
| E-186 | P-948 |
| E-187 | P-953 |
| E-188 | P-958 |
| E-189 | P-963 |
| E-190 | P-968 |
| E-191 | P-973 |
| E-192 | P-978 |
| E-193 | P-983 |
| E-194 | P-988 |
| E-195 | P-993 |
| E-196 | P-998 |
| E-197 | P-1003 |
| E-198 | P-1008 |
| E-199 | P-1013 |
| E-200 | P-1018 |
| E-201 | P-1023 |
| E-202 | P-1028 |
| E-203 | P-1033 |
| E-204 | P-1038 |
| E-205 | P-1043 |
| E-206 | P-1048 |
| E-207 | P-1053 |
| E-208 | P-1058 |
| E-209 | P-1063 |
| E-210 | P-1068 |
| E-211 | P-1073 |
| E-212 | P-1078 |
| E-213 | P-1083 |
| E-214 | P-1088 |
| E-215 | P-1093 |
| E-216 | P-1098 |
| E-217 | P-1103 |
| E-218 | P-1108 |
| E-219 | P-1113 |
| E-220 | P-1118 |
| E-221 | P-1123 |
| E-222 | P-1128 |
| E-223 | P-1133 |
| E-224 | P-1138 |
| E-225 | P-1143 |
| E-226 | P-1148 |
| E-227 | P-1153 |
| E-228 | P-1158 |
| E-229 | P-1163 |
| E-230 | P-1168 |
| E-231 | P-1173 |
| E-232 | P-1178 |
| E-233 | P-1183 |
| E-234 | P-1188 |
| E-235 | P-1193 |
| E-236 | P-1198 |
| E-237 | P-1203 |
| E-238 | P-1208 |
| E-239 | P-1213 |
| E-240 | P-1218 |
| E-241 | P-1223 |
| E-242 | P-1228 |
| E-243 | P-1233 |
| E-244 | P-1238 |
| E-245 | P-1243 |
| E-246 | P-1248 |
| E-247 | P-1253 |
| E-248 | P-1258 |
| E-249 | P-1263 |
| E-250 | P-1268 |
| E-251 | P-1273 |
| E-252 | P-1278 |
| E-253 | P-1283 |
| E-254 | P-1288 |
| E-255 | P-1293 |
| E-256 | P-1298 |
| E-257 | P-1303 |
| E-258 | P-1308 |
| E-259 | P-1313 |
| E-260 | P-1318 |
| E-261 | P-1323 |
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| E-263 | P-1333 |
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| E-266 | P-1348 |
| E-267 | P-1353 |
| E-268 | P-1358 |
| E-269 | P-1363 |
| E-270 | P-1368 |
| E-271 | P-1373 |
| E-272 | P-1378 |
| E-273 | P-1383 |
| E-274 | P-1388 |
| E-275 | P-1393 |
| E-276 | P-1398 |
| E-277 | P-1403 |
| E-278 | P-1408 |
| E-279 | P-1413 |
| E-280 | P-1418 |
| E-281 | P-1423 |
| E-282 | P-1428 |
| E-283 | P-1433 |
| E-284 | P-1438 |
| E-285 | P-1443 |
| E-286 | P-1448 |
| E-287 | P-1453 |
| E-288 | P-1458 |
| E-289 | P-1463 |
| E-290 | P-1468 |
| E-291 | P-1473 |
| E-292 | P-1478 |
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| E-295 | P-1493 |
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| E-297 | P-1503 |
| E-298 | P-1508 |
| E-299 | P-1513 |
| E-300 | P-1518 |
| E-301 | P-1523 |
| E-302 | P-1528 |
| E-303 | P-1533 |
| E-304 | P-1538 |
| E-305 | P-1543 |
| E-306 | P-1548 |
| E-307 | P-1553 |
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| E-310 | P-1568 |
| E-311 | P-1573 |
| E-312 | P-1578 |
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| E-317 | P-1603 |
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| E-398 | P-2008 |
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| E-433 | P-2183 |
| E-434 | P-2188 |
| E-435 | P-2193 |
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| E-459 | P-2313 |
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| E-461 | P-2323 |
| E-462 | P-2328 |
| E-463 | P-2333 |
| E-464 | P-2338 |
| | |

Philco Famous for Quality the World Over

Cuts costs with Yale Electric Trucks

Famous for Quality in Materials Handling Equipment



What business are *you* in? Food-processing, motor freight-terminal operation, textiles, lumber, tool-making? Whatever it is—you *must* move materials from one point to another.

How many men do you employ? Ten—or ten thousand? Regardless of the number, efficient, economical handling of your materials is more important today than ever before.

It may mean the actual difference between profit and loss!

YALE MATERIALS HANDLING EQUIPMENT... is accounting for 50 to 75% savings in many businesses today—businesses that never realize how costly their old-fashioned handling methods were. Yale is the world's leading manufacturer of materials handling equipment. You can depend on Yale—to give expert attention to your specific handling needs.

YALE
MATERIALS HANDLING
EQUIPMENT

YALE is a registered trade mark of The Yale & Towne Manufacturing Co.

YALE GAS AND ELECTRIC INDUSTRIAL TRUCKS • YALE WORKSAVERS • YALE HAND TRUCKS • YALE HAND AND ELECTRIC HOISTS • YALE PUL-LIFTS

**Yale Electric Hydraulic fork trucks
gave Philco—world-leader in electronic
equipment—this 3-way saving...**

● **MONEY SAVED!** Knocked the bottom out of handling costs in plant, warehouse and at shipping points.

● **LABOR SAVED!** The change-over from manual handling methods to mechanized Yale equipment greatly increased man-power's effectiveness—released extra men for more important productive work.

● **TIME SAVED!** Boosted parts handling, cut assembly time, spurred shipping operations, and eliminated many bottle-necks at times when increased production was absolutely essential!

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I want to know how Yale Materials Handling Equipment can help me.
 Please have your local Representative call.
 Please send free copy of
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Street _____ City _____ State _____

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Box 337—Postal Station "A"—Toronto



AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

Sub-Miniature Relay



Filters sub-miniature relay.

Type 26A18 relay is a sub-miniature, six-pole, double-throw, d-c unit designed to meet, and in several respects exceed, the requirements of Spec. MIL-R-5757. It is hermetically sealed, thoroughly degassed and nitrogen filled at a pressure of one atmosphere.

The relay is actuated by a rotary motor of new proven design that is said to have a high torque factor to weight and size ratio.

The contact mechanism is reportedly designed to resist the effects of severe shock and vibration and to give long life under extreme service conditions. Beryllium copper contact arms are welded directly to the header terminals. Palladium contacts serve as the current interrupting material. Contact arrangement is break-before-make and conservatively rated at 3 amp resistive load, 1.5 amp inductive load, and 12 amp overload at 26.5 v dc. *Electroquipt Controls Div., Filters, Inc.*

Circle P-1 on page 65 for more data

G-Accelerator

Model C g-accelerator has been added to a line of testing devices. The new eight-ft diam model is similar in arrangement and operation to

the smaller 56-in. diam Model B and incorporates optical, pneumatic, and electrical systems combined for testing aircraft and guided missile components of a larger size than heretofore possible.

The device applies a steady force of controlled magnitude to parts or assemblies for calibration or for observing functional behavior under simulated operating conditions. An indicating tachometer and a precision timer, combined with a solenoid-operated rpm counter, are said to measure speed with sufficient accuracy to determine g-loadings with an error of less than 0.1 per cent, dependent upon the time interval chosen. All controls terminate at the operating console, which contains a built-in conversion chart for rpm, radius of gyration, and acceleration.



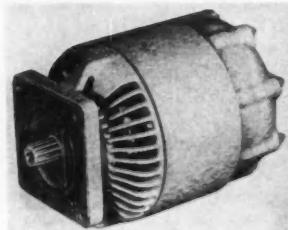
Genisco Model C g-accelerator.

With the object mounted in the center of the 24-in. square platform, precisely controlled speeds, adjustable from five to 280 rpm and developing normal acceleration forces up to 75 g, are said to be readily attainable. An important feature for routine production testing is the ability of the machine to return to a preset speed by use of the starting switch only. Time to reach full speed from standstill is approximately 30 sec.

The maximum capacity of the test object is limited to a volume of 18 in. by 18 in. by 24 in. up to 100 lb. The maximum acceleration force is limited to 2000 g-lb. *Genisco, Inc.*

Circle P-2 on page 65 for more data

Lightweight Motor



U. S. aircraft motor

Said to weigh only 20% lb, an aircraft motor now in production develops 10 hp for continuous duty. Available with output shaft speeds of 11,000 or 7300 rpm, the unit is suited for such applications as control actuators, hoists, bomb bay doors, etc., and is designed to meet Air Force Spec. 32590.

The type A motor operates on 400-c, three-phase ac and offers pre-packed ball bearings, splined take-off shaft, AN mounting pad, rapid acceleration, and high torque, according to the manufacturer. *Aircraft Div., U. S. Electrical Motors, Inc.*

Circle P-3 on page 65 for more data

Miniature Nuts

Miniature hexagonal stop nuts, as small as 0.109 in. across flats, have nylon locking inserts and are available in brass and aluminum.

The nuts are expected to find wide use in specialized applications, particularly in the electronics (guided missiles, for example) and instrumentation fields. *Elastic Stop Nut Corp. of America.*

Circle P-4 on page 65 for more data

Twenty-three

(that's 23)

leading engine manufacturers
use as original equipment

Sealed Power Piston Rings

faced with

CHROME

Naturally, Sealed Power also has the finest chrome-faced rings for replacement use, in Sealed Power KromeX Ring Sets—to fight HEAT, FRICTION, ABRASION, and CORROSION, the four deadly enemies of piston ring life. These sets include the famous MD-50 Steel Oil Ring, the only ring with the Full-Flow Spring.

Sealed Power Piston Rings

SEALED POWER CORPORATION • MUSKEGON, MICHIGAN

Sole manufacturers of KromeX Ring Sets, MD-50 Steel Oil Ring, Full-Flow Spring, Flex-S Flexible Oil Ring, and GI-60 Groove Inserts.
Leading producer of Automatic Transmission Rings and Non-Spin Oil Rings.

The BUSINESS PULSE

Business Shows Signs of More Optimistic Atmosphere Since Election, with Operations in Most Lines At or Close to Record Levels, and Personal Incomes at New High. Prices Show Slight Downward Trend.

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

Less "Big Government"

Business confidence seems to have been favorably affected by the outcome of the election. Public statements by the President-elect before, during, and since the campaign have indicated that his general attitude toward politico-economic questions is one of moderation based upon an underlying belief in and devotion to free institutions. He is expected to work for the restoration and maintenance of a more cordial and sympathetic relationship between Government and business than has prevailed in recent years. He has repeatedly stressed his disapproval of the trend toward "Big Government" and his leaning toward broad lines of policy generally advocated by business spokesmen, such as sound money, orthodox fiscal practices, a more impartial governmental attitude toward relations between labor and management, and Federal economy with a view to alleviation of the tax burden.

Unless international affairs change for the worse—which is a possibility always to be considered—it is believed that, under the new Administration, governmental controls will be held to a minimum and existing regulations abolished as rapidly as is feasible under prevailing conditions. The favorable business situation at the moment will apparently give newly appointed officials time to become familiar with their jobs before urgent situations arise. Plans for legislative action are already being made by Congressional leaders in consultation with General Eisenhower and his advisers. It appears that the new President will have more effective support in Congress than his predecessors has been able to obtain in the last few years.

Among the tangible signs of the more favorable business atmosphere since the election is the tone of financial markets. On the New York Stock Exchange, for example, the volume of trading has been larger and the trend of prices moderately upward.

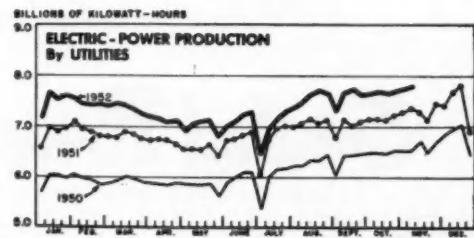
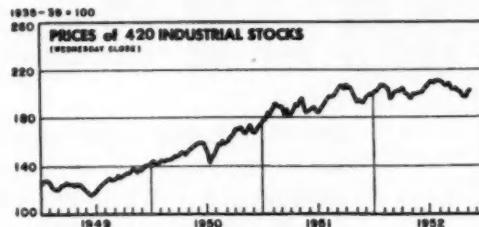
Business operations in most lines continue at or

close to record levels, and it seems to be generally agreed that the outlook for the next few months is promising. The latest reports show further gains in production and income. Unemployment is the lowest since World War II—is, in fact, below what has been commonly regarded as the irreducible peacetime minimum. Retail trade has been somewhat disappointing to those who held highly optimistic views, partly because of unfavorable weather and partly, it seems, because many consumers hope for lower prices. Dealers, however, apparently continue to anticipate record-breaking Christmas trade and are planning accordingly. The prevailing tendency in primary wholesale prices has been downward. This weakness has been evident in such key agricultural products as cotton and corn, even though autumn marketings have passed their peak. Industrial commodities also have moved somewhat lower, on the average, despite rallies in some important products.

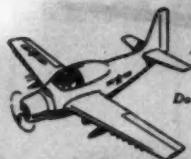
Largest Ingot Output

Continued record-breaking steel output has stimulated
(Turn to page 76, please)

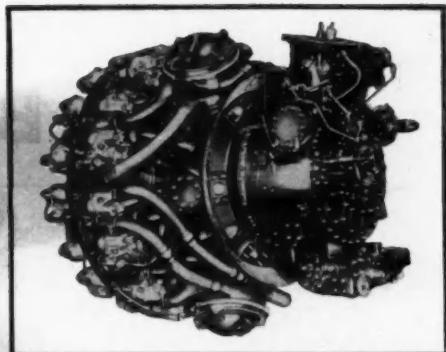
Selected Business Indicators



Source: U. S. Dept. of Commerce



Douglas "Skyraider"



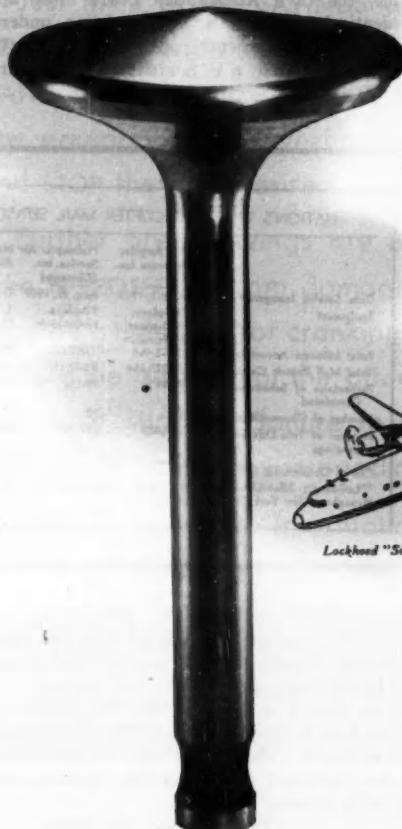
Wright Turbo Compound Aircraft Engine

they fly on Wright Engines...

with THOMPSON VALVES



Martin "Marlin"



Lockheed "Super Constellation"



VALVE DIVISION

Thompson Products, Inc.

CLEVELAND 17, OHIO

AIR BRIEFS



By ROBERT McLAREN

Still More Cutbacks

Both Air Force and Navy announce further reductions in production plans for new combat aircraft. Air Force has cut back production on the Lockheed F-94C Starfire all-weather fighter by 35 per cent, which will permit completion of the remaining portion of the order by early 1954. Also cut back is the Northrop F-89 Scorpion all-weather fighter, with production now scheduled to end in early 1955 instead of the end of 1958 as originally planned. Reductions in the orders for these two-man, all-weather fighters follow closely on the successful evaluation program on the one-man North American F-86D all-weather fighter, which recently established a new world's speed record of 699.92 mph (on one pass over the official course it flew at 702.6 mph). Navy has slashed its production order for the FJ-2 carrier version of the Sabre by one-third and made cuts of 13 per cent in the Douglas AD-5 Skyraider and 18 per cent in the swept-wing Grumman F9F-6 Cougar. Unlike the so-called stretch-out, these cuts in production are to release funds for assignment to other, more advanced combat aircraft. None of them has any effect on the current production rate; they merely lop off airplanes at the far end of the contract, meaning its termination at an earlier date. But contracts for more modern models will follow close on the heels of such terminations.

Jet Transport

Boeing is playing a long gamble on its new model 707 civil jet transport but it is increasing the odds even further by keeping all details of the project secret until the airplane is ready. The company is shunning the time-honored high-pressure sales program usually followed in preparing a new design for airline use in which elaborate brochures and 12-man teams tour the various airlines as long as three or four years in advance of the projected airplane. Instead, Boeing is not even revealing facts on its new jet to its most-probable U. S. airline customers and is saying merely "Wait and see" to all the curious. Although it can be strongly doubted that the program will be able to stand the mounting curiosity for more than a few months, Boeing is determined now to roll the airplane out about July, 1954, ready to fly and only then will anyone outside the company have any inkling of its details.

Trans-Polar Rebound

The magnificent trail-blazing passenger flight across the North Pole by Scandinavian Air Lines' Douglas DC-6B transport is creating somewhat unexpected repercussions in Washington. The flight, covering the 5852 miles from Los Angeles to Copenhagen via Edmonton and Thule in 23 hr 38 min flying time, was a survey flight for a projected scheduled airline service over the North Pole. SAS, the airline, has requested permission of U. S. and Canadian authorities for operation of the service. In order to approve the schedule, the Civil Aeronautics Board must approve an identical route by a U. S. airline under existing reciprocal agreements. But—and here's the rub—such a service by a U. S. airline would require a heavy

NATION'S THREE HELICOPTER MAIL SERVICES

| | Los Angeles Airways, Inc. | Helicopter Air Services, Inc. (Chicago) | New York Airways, Inc. |
|-----------------------------------|-----------------------------------|---|------------------------|
| Date Service Initiated | Oct. 1, 1947 | Aug. 20, 1949 | Oct. 15, 1952 |
| Equipment | 3 4-place, 2 12-place Helicopters | 7 3-place Helicopters | 1 12-place Helicopter |
| Total Milesage Accumulated* | 1,473,464 | 1,000,426 | 480 (3 days) |
| Total Mail Pounds Carried | 19,722,364 | 8,440,117 | 8,482 |
| Percentage of Schedules Completed | 94.95% | 96.1% | 100% |
| Number of Communities Served | 42 | 50 | ** |
| Number of Take-Offs and Landings | 200,000 | 216,000 | 48 |

*As of October 18, 1952.

**LaGuardia, Idlewild and Newark Airports at start. Service to be expanded throughout New York City metropolitan area.

subsidy payment since such a route, on the basis of present estimates, could not be operated profitably. Pan American, typically, is ready to start the service upon receipt of approval but TWA, which operates a Los Angeles-Paris route via New York, would object strenuously. Here's one for the Republicans, who have indicated a forthcoming complete overhaul of CAB's policies.

(Turn to page 114, please)



Just think of the SAVINGS and ELIMINATION of LOST PUMPING HOURS when one man can control an entire field of pumps either MANUALLY or by TIME CLOCKS. This is possible when the engines are equipped with Synchro-Start Automatic Controls to START and STOP them as desired.

Further great savings are accomplished by the fact the engine is PROTECTED from damage while starting and running. They provide a time limit for cranking when starting and will shut down the engine and signal the attendant should an abnormal condition arise, such as—failure to start—lack of fuel—low oil pressure—overheating—overspeeding—or should a pump rod break.

Write us for more information as to how you can greatly reduce your pumping costs. We will be pleased to help you.

8th Annual Meeting of the MAGNESIUM ASSOCIATION

Automotive and Aircraft Applications of Magnesium Discussed at TECHNICAL SESSIONS.

THE Eighth Annual Meeting of the Magnesium Association, held in New York City last month, featured a Casting Division session, technical sessions, and a general session. In addition, an interesting display of magnesium forms and products was exhibited during the meeting. Registration totaled 475, a new high for the association.

A complete new slate of officers was elected for the coming year. Succeeding A. W. Winston as president is J. S. Kirkpatrick, director of research and development of Brooks and Perkins, Inc. W. C. Murray of Utica Radiator Corp. was elected vice president and R. D. Taylor of the Federated Metals Division of American Smelting and Refining Co., treasurer.

As usual, chief interest was in the technical papers presented during the meeting. Speaking on the subject of drop hammer forming of magnesium sheet, Francis L. Coenen, Boeing Airplane Co., said that magnesium hammer formed parts have several distinct advantages. Weight saving is obvious by direct substitution for aluminum, providing structural minimums are met. The high degree of formability has also permitted the design of more intricate parts, thereby eliminating splices and reducing assembly time. In cases where single impact forming is possible, forming time is reduced over that required for 24S-O. In general, the quality of the finished part is superior to that of aluminum because of closer spring-back control, less compressive wrinkling, and improved surface finish planishing operations are eliminated.

On the negative side of the picture, Mr. Coenen said that it should be considered that cost of heating equip-

ment must be justified and amortized over a specific period. Certain operator inconveniences also exist due to radiation of heat from the platen and die masses. A premium rate may be required for these operators. Normal magnesium fire precautions are required and to date not a single fire has resulted in Boeing Airplane Company's hammer forming of magnesium.

Present engineering application of annealed magnesium drop hammer formed parts is limited only by the relatively low mechanical properties of the material, according to Mr. Coenen. Continual pressure is on the tool engineer to devise methods that will permit an increased use of the hard rolled material with its associated higher properties.

Captain Dale H. Black, Structures Branch, Aircraft Laboratory, Wright Air Development Center, presented a paper entitled "Magnesium in Military Aircraft." In closing, he stated that in the near future, magnesium will lose all of its mystery and uniqueness, and will be "deglamorized" into just one of our common, readily available, aircraft structural materials. It need not be used just for the sake of usage, neither must it be used where another material can obviously do a better job. It must stand on its own capabilities, and when selected accordingly, need never compromise structural capabilities but will either maintain or increase the high efficiencies required in our military aircraft components.

Following are abstracts of two other papers:

Automotive Service Experience with Magnesium

By F. H. Mason, Chrysler Corp.

THE advent of a new material into a high production industry such as the manufacture of automobiles is usually accompanied by considerable doubt and hesitation since the consequences of error are rather disastrous. We should not expect, therefore, that magnesium, which has had its production infancy in the last five years, would be enthusiastically received by all concerned. However, this is probably just as well since a very nominal application of 30 lb of magnesium to a car would, during a normal automotive production year, require 250,000,000 lb of magnesium which would somewhat burden the productive capacity of the magnesium industry.

(Turn to page 100, please)



Second No. 24 Hydraulic and finished propeller shafts.



First No. 24 making chips on small end of shaft.

from GISHOLT No. 24 AUTOMATIC LATHES

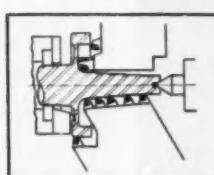
For speed and precision on these hefty drive gear and propeller shafts, production is divided between a pair of Gisholt No. 24 Hydraulic Automatic Lathes. The first machine gets the 275 lb. steel forging for nine different turning, chamfering, and facing operations on the 16" gear blank and five-shaft diameters. 12 minutes later, the part moves to the second machine where nine tools perform similar work on the other side of the flange. Time again is 12 minutes.

Together, the two No. 24 Hydraulics remove a total of 75 lbs. of material. One man operates both machines. Another tough job handled to perfection by these high production machines.

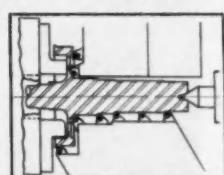
The Gisholt No. 24 Hydraulic, like the famed smaller No. 12 combines ease of setup with exceptional speed and accuracy—all with fully automatic operation that means low costs on any job. If you have work up to 24" diameter, you should have full details on the rugged, powerful, No. 24 Automatic.

GISHOLT

MACHINE COMPANY Madison 10, Wisconsin



Tool arrangement for first operation.



Tool arrangement for second operation.

THE GISHOLT ROUND TABLE

represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

The BUSINESS PULSE

(Continued from page 70)

lated the hope that consuming industries handicapped by shortages will be relieved more quickly than seemed possible after last summer's steel strike. Ingot output in October was the largest on record, and production in November is believed to have been approximately as great, despite the shortness of the month.

There is still some uncertainty as to whether lake shipments of iron ore, which were interrupted by the steel strike, have been sufficient to provide for full-scale ingot output until the reopening of the lakes in the spring. If not, heavier use of scrap will be necessary. This contingency raises another question of possible

shortages. Although inventories of scrap at present are considered ample, the situation in this respect could change if the four per cent decline reported for October should continue.

Another cause of uncertainty is the still unsettled status of the coal-wage question. A long coal strike could be very troublesome to the steel industry. Executives, however, do not appear to be unduly concerned over this possibility. They believe, apparently, that negotiations will produce a settlement that will prevent a prolonged suspension of coal-mining.

Controls to be Modified Soon

Notwithstanding these uncertainties, it seems to be generally thought that a rough balance between demand and supply, for some steel items at least, will be achieved by the second quarter of 1953. Defense officials and industry representatives have been conferring on possible ways of ending the Controlled Materials Plan. These discussions are still in the formative stage, but present indications are that existing controls will be considerably modified in the near future.

The improvement in steel supply is reflected in the durable-goods industries. Output of durable manufactures in October is estimated by the Federal Reserve Board at 289 per cent of the 1935-39 average, on a seasonally adjusted basis, or about 25 per cent above the low level reached during the steel strike. Deliveries of new freight cars also rose sharply in October, although the addition of new cars to the transportation system is still seriously behind schedule. Boxcars are already in short supply, and the deficiency is expected to become even more serious if business activity continues at existing levels. Automobile production has risen to the highest level in almost a year and a half, but it is doubted that the present rate can be maintained unless steel allotments are increased.

Conditions in nondurable goods also have improved since last summer, although the gains are comparatively moderate. Production of nondurable manufactures, according to the seasonally adjusted Federal Reserve figures, was about nine per cent higher in October than in July. Most of the advance took place from July to August. The rise since then has been relatively small. Especially significant in this group is the high level of output and shipments of paperboard, reflecting the large demand for packaging materials.

(Turn to page 78, please)

When You Need Pump Replacements...

TUTHILL PUMP GUIDE

Let this TUTHILL PUMP
GUIDE Save You Time
and Trouble.....

There's a Tuthill positive displacement internal-gear rotary pump to meet your needs in lubrication, hydraulic, coolant, and liquid transfer service.

To help you select the right pump for your replacements, Tuthill offers this handy, letterhead-size reference chart. It shows the Tuthill pumps available for each type of service, complete with capacities, pressures, speeds, packing, mounting and exclusive performance features. It makes the job of picking the right pump easier than ever before. It saves you time, work and trouble.



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"Made for Each Other!"

**SERVICE PISTON RING SETS BY MUSKEGON
ARE DESIGNED FOR A SPECIFIC ENGINE ONLY!**

This set of service piston rings was designed not just for *any* engine...
but for *one* particular engine only!

Thus, like the original rings, these service rings and their engine
have been truly "made for each other" and will insure
the maximum of power and economy.

Rings like these are the end result of close collaboration
between the car manufacturer and Muskegon Piston Ring Company,
whose facilities encompass every service from
engineering counsel to complete packaging.

These *Factory Approved* and *Factory Engineered* Service Piston
Ring Sets are available only through car dealers
and other authorized service outlets.

Engine maker* and Muskegon,
engineered this set of service rings
for a single, specific engine.



*Name on request

Copyright 1952 by Muskegon Piston Ring Company



THIS TAPE PREVENTS BREAKAGE won't stain or mar finishes

• Here's a quick, convenient way to protect your products during shipment. Just place strips of Armstrong's DK-153 Tape at all points of contact between case and product.

The resilient tape serves as a protective cushion. It absorbs the shocks and helps keep fragile products from breaking. That's why it's used to pack everything from delicate instruments to heavy defense materials.

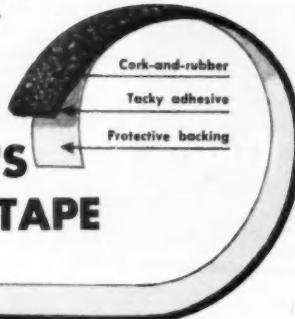
DK-153 Tape has a cork-and-rubber surface that won't scratch or stain. It contains no lubricants or corrosive ingredients.

This handy tape is easy to apply because it carries its own adhesive. Just peel off the cloth backing and press the tape into place. It sticks instantly to any clean, dry surface.

You can get DK-153 Tape in sheets and rolls of various widths and thicknesses or in die-cut shapes. For samples, write on your letterhead to Armstrong Cork Co., Cork-and-Rubber Products Department, 8512 Arch St., Lancaster, Pennsylvania. Available for export.



ARMSTRONG'S DK-153 TAPE



BUSINESS PULSE

(Continued from page 76)

Incomes at New High

Rising industrial activity, combined with the usual autumn increase in farm marketings, has carried personal incomes to new high levels. The total for September is placed at an annual rate of \$273.3 billion, more than \$3 1/2 billion above the August figure and \$16 billion above that for September of last year. Notwithstanding higher taxes, disposable income is believed to be running about three per cent higher than it was a year ago, whereas the cost of living has risen only about one per cent. This expansion of income, apparently, underlies the optimistic expectations for Christmas trade in the face of the somewhat disappointing returns for recent weeks.

Price trends have been mixed, with perhaps slight balance on the downward side, despite active business and favorable expectations. A number of farm commodities have moved lower, including cotton, corn, and some animal products. Conspicuous among recent changes in industrial prices have been declines in lead and zinc. The weakness of wholesale prices is finally being reflected in the cost of living, which, according to the official index, declined 0.5 per cent during the quarter ended October 15, bringing a small cut in hourly wages of about a million workers in the automotive and aircraft industries under the escalator clauses.

The money market has continued relatively tight, with persistent demand for bank funds and further seasonal increases in business loans, together with an unusually large rise in the amount of money in circulation. Borrowings from the Federal Reserve banks have risen to the highest level in more than thirty years. The general expectation is that money will remain tight during most of the remaining weeks of the year, with a further drain on bank reserves resulting from additional increases in business loans and money in circulation.

AUTOMOTIVE INDUSTRIES . . .

*is your News Magazine of
Automotive and Aviation*

MANUFACTURING

NATIONAL OIL SEAL LOGBOOK

Reprints from this or other Logbook pages are available for your files. Request them from our Redwood City, California office

Four different ways leading manufacturers use the same standard-design oil seal

A widely used standard-design leather seal is the National 50,000 series oil and grease seal shown in Figure 1. The broad applicability of this design can be seen in the variety of ways it is used by different equipment manufacturers.

For example, in the rear clutch bearing of the Caterpillar DW-20 tractor (Figure 2) two National 50,000 seals are used. The seal at the inside position faces the ball bearing and prevents bearing grease from entering the clutch. The outer seal faces away from the bearing and seals on a coupling joining the splined drive shaft. Facing this seal outward permits flush lubrication of the bearing and guards against entry of dust, dirt or mud.

A similar use of the same seal is found in the hoist drum assembly of the Marion Type 93-M Power Shovel (*not illustrated*). Here four large National 50,000 series seals are used at widely separated bearing positions. Two outer seals at extreme ends of the assembly are faced toward bearings to retain lubricant. Two inner seals are faced away from bearings to permit flush lubrication and afford extra protection from foreign matter.

Where space limitations are not extreme, these same seals can be paired to form a dual seal. An example is the pinion shaft assembly of the Hyster Hi-Speed Winch (Figure 3). Here two standard-design National 50,000 seals



Fig. 1. National 50,000 Series Leather Seal

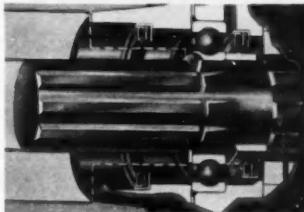


Fig. 2. Tractor Clutch Assembly

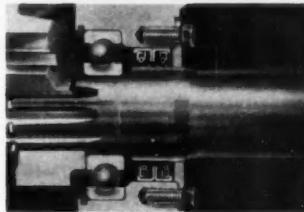


Fig. 3. Winch Pinion Shaft



Fig. 4. Drilling Rig Drum Shaft

are mounted back to back, fulfilling the function of a dual opposed seal. This same procedure may be followed where a dual tandem seal is required, as in the Emsco GB-800 oil field drilling rig (Figure 4). Here two National 50,000 series seals are mounted side by side, with sealing lips pointing in the same direction.

In each of these applications, National leather seals contribute to the dependable operation of the equipment. The extra heavy construction of these seals provides a margin of safety against inexpert field replacement. And since National leather sealing members retain lubricant within themselves, they can operate "dry" for some time, thus providing a margin of safety against lubrication neglect. National 50,000 series leather seals are available for many standard bore and shaft sizes. For complete information, write direct to factory or to the National Oil Seal engineer nearest you.

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 519 South Broadway, Wichita 2-6971

Pit-Type Carburizing Furnaces

(Continued from page 47)

pressures because of the mechanical removal of exhaust gases. Low-pressure, diffusion-type burners are used on the radiant tubes. Protection for the heater tubes is provided by eight T-angle guard rails, spaced symmetrically about the inside diameter of the furnace.

Carrier gas and carburizing gas, premixed, enter the furnace through

its lower wall by a tube level with the fan and directly opposite to the outlet for the effluent tube. Lines for the pilot lights, which burn continuously, are independent of other furnace components for safety reasons. Gas consumption for each of the furnaces is approximately 600 cfm per average load.

A six-blade, 24-in. recirculation fan

at the bottom center of the furnace forces the circulation. It is driven by a 7½-hp motor which also drives the exhaust fan, for cooling by means of drawing cold air through the heater tubes. Gas and air for the pilots are premixed to a suitable combustion ratio, the air being supplied by 16-oz blowers.

A maximum of 8900 lb, including the weight of grids and basket, is loaded in the furnace at one time. Track bushings, parts of any regular cylindrical shape having a diameter larger than 2½ in., or parts of irregular shape that will not fall through or become wedged in the grid, can be loaded in the baskets.

Baskets and grids are made of 35-15 nickel-chrome cast alloy. Each basket section has a 22-in. height and 36-in. outside diameter. When three sections are assembled, the overall height of the complete basket measures 71 in., with a combined working height of 57 in. with grids, 63 in. without. The sections are held together by engaging four lugs on the bottom of a section with four dogeers of five-in. height, located 90 deg apart on the top of another section.

While the furnace is in operation, the hydraulically-operated lid is sealed. Chrome ore sealing compound is placed in a circumferential, U-shaped channel which interlocks with a similar inverted channel on the periphery of the lid.

Eighteen control panels are aligned along the edge of the pit, each panel being divided into two sections with the recording equipment above, and relays and other electrical equipment below.

A horn and large red attention light are mounted on top of the control panel. Six small red lights mounted below the top of the control panel indicate the sequence of the carburizing cycle. Each light works in conjunction with the warning horn and large red light to indicate:

1. Super purge.
2. Furnace at carburizing temperature.
3. Start carburizing gas.
4. Stop carburizing gas.
5. Start of cooling period.
6. End of cooling period.

A recorder controller connected to a 24-in., 8-gage, Chromel-Alumel thermocouple, keeps a constant record of, and governs, furnace temperature. An excess temperature cut-off to the



Skys the Limit—



Limited Plant Space Problems Solved By This Roof-Top Installation Of A Peters-Dalton Large Paint Baking Oven

The photograph above is of a recent Peters-Dalton installation. PD engineers solved this manufacturer's problem by meeting his needs for an efficient, cost-saving, Paint Baking Oven without sacrificing valuable square footage within his plant. This roof-top installation with automatic temperature control and especially insulated to prevent heat loss has been engineered to receive painted parts direct from the paint-spray lines.

PD engineering experience and production ability insures thorough analysis of your problems. Any type Paint Drying or Baking Oven designed for your special requirements . . . safeguarding your product's quality . . . giving efficient, economical and trouble-free operation. We'll be glad to tell you more if you — write, wire or phone.



PD Point Spray Booths PD Drying and
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tems PD Industrial Washing Equipment



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Unique production processes build Extra quality into



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Years of production experience and close engineering cooperation with leading engine manufacturers, combined with modern high-volume facilities, enable Eaton to furnish high-quality valve seat inserts to meet the specific requirements of the automobile, truck, and tractor industries. The range covers all types of inserts from low-priced, volume production passenger car inserts up to large-size, puddled-face inserts of suitable materials for large heavy-duty installations. A unique method of puddling special facing materials on insert seats enables Eaton to furnish inserts with superior corrosion and wear-resistant qualities at minimum cost.

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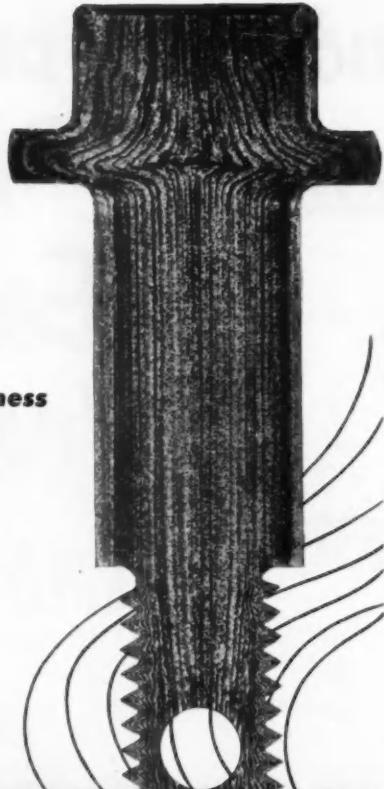


PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

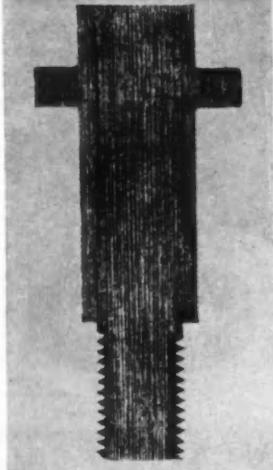
No Structural Weakness

with

CAMCAR
COLD-FLOW



Machined



Cold-Flow

See the difference!

These two parts, one made by high production Camcar Cold-flow and the other by machining, were microphotographed to give visual proof of the strength and accuracy inherent in Camcar Cold-flow.

Notice the smooth structural lines of the Cold-flow part following the entire contour, including the threads. The metal flows where strength is required; machining cuts away the natural grain flow.

Order Camcar Cold-flow small metal parts for maximum tensile strength and close tolerances. You'll be convinced of the tremendous quality and production advantages on your first Camcar Cold-flow order. Send us prints or prints today.

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PRODUCTION DESIGNED FOR YOUR ASSEMBLY LINE.

left of the recorder opens the circuit on a Maxon safety gas valve if the temperature limit of the recorder is exceeded.

Two flowscopes show the amount of carrier and carburizing gas entering the furnace. A manually operated valve on the panel controls the amount of carburizing gas, whereas the carrier gas flow is set by a regulator in the line. A running hour counter records use time, while four timers govern the purge, equalizing time, carburizing time, and diffusion time. The warning horn reset button and the recirculating fan motor "start and stop" button are on the bottom section of the panel.

Each of the two RX atmosphere generators has a normal output of 2400 cfm which can be increased to a maximum of 2800 cfm, using 522 cfm natural gas for fuel and an additional 556 cfm for conversion to carrier gas. The gas coolers use 432 gph of water entering at 75 F and discharging at 100 F.

The purpose of these units is to produce carrier gas low in methane, practically devoid of water vapor and carbon dioxide, non-decarburizing and non-oxidizing. The carburizing potential of the RX gas is increased by the addition of natural gas before introduction into the furnace.

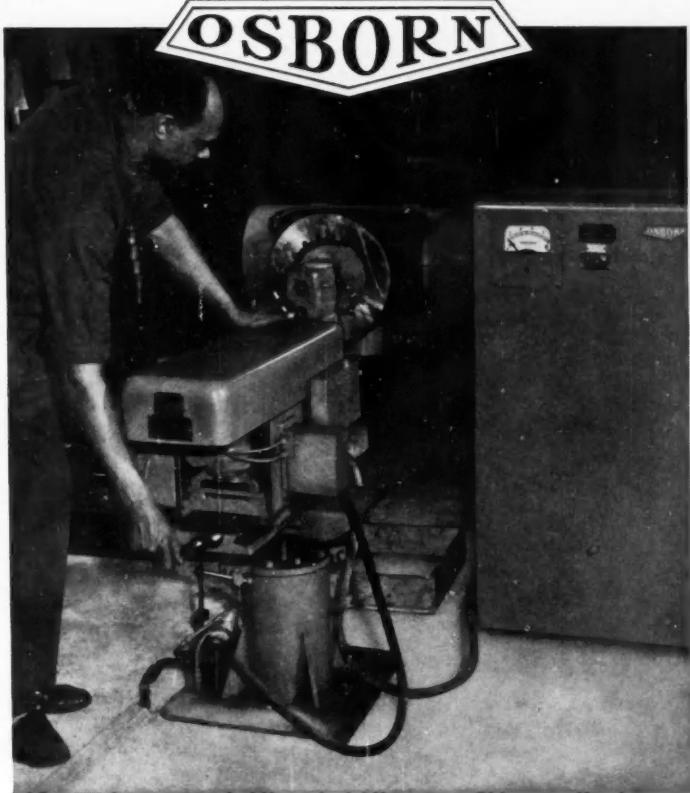
Analysis of RX gas is obtained by using a Burrell Portable Senior Model R Orsat-type gas analysis apparatus. A good RX gas should contain no carbon dioxide or oxygen, and have a dew point between 10 to 20 F. RX gas with a high methane content will deposit carbon in the reaction tubes. Less than 0.4 per cent methane is best for satisfactory operating conditions. A typical analysis of RX gas using 75 F saturated air is as follows: CO₂0%; O₂0%; CO-20.9%; H₂-40.7%; CH₄-0.4%; N₂-38%.

A furnace analysis would be dependent upon the part of the cycle during which it was taken due to the fact that the atmosphere in the furnace varies for each change in the cycle. A typical analysis taken during the carburizing period is as follows: CO₂0%; O₂0%; CO-16.6% H₂-45%; CH₄-6.4%; N₂-Remainder.

The carburizing cycle of a typical load of bushings for a large tractor with a case depth specification of 0.080 in. to 0.100 in. is as follows:

After the sections are loaded with bushings at the bushing turning machine by the machine operator, they are conveyed to the washer and cleaned and allowed to dry. The section is then combined with two other sections to make a furnace charge.

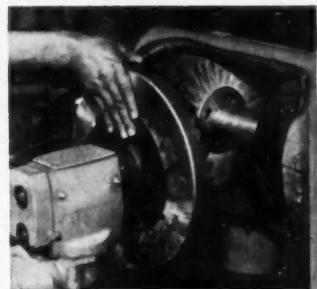
(Turn to page 87, please)



OSBORN



SET-UP IS SIMPLE. The machine is versatile. If your production involves small runs of many different types and sizes of gears and similar parts, you can specify machine settings for each part and operator can make set-up changes easily and quickly for maximum daily output. The complete brushing cycle is controlled automatically by the electronic timer which is set for any desired brushing interval to suit the size, shape or condition of part being brushed.



Deburr gears 15 times faster at the push of a button!

Want to break a big bottleneck in the production of gears and similar parts? Manufacturers are doing just that with the Osborn Work Holder Brushing Lathe.

In the plant of the White Motor Company, Truck Division, Cleveland, Ohio, this Osborn machine deburrs and finishes gear teeth 1570% faster than the old method. This was done formerly with a portable grinder... a tedious operation that took 25 minutes for the 14-inch hypoid gears shown. Now, an operator simply places the gear in the Osborn Work Holder Brushing Lathe, pushes a button and the machine does the job automatically. Floor-to-floor time is only 1½ minutes! Uniformity of finish results in additional time savings in matching and assembly of gears.

It will pay you to investigate this high-speed, high-quality machine for deburring and finishing gears on a production basis. Call your **Osborn Brushing Analyst** today or write *The Osborn Manufacturing Company, Dept. 899, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brusher

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

AUTOMOTIVE INDUSTRIES, December 15, 1952

OPERATION IS SPEEDY. The operator mounts the gear easily and quickly. The gear advances to the face of two rotating Osborn brushes and the edge of the gear teeth makes contact with the brushes. To assure fast, positive action on each piece brushed, an automatic control reverses the direction of brush rotation on every cycle of operation.



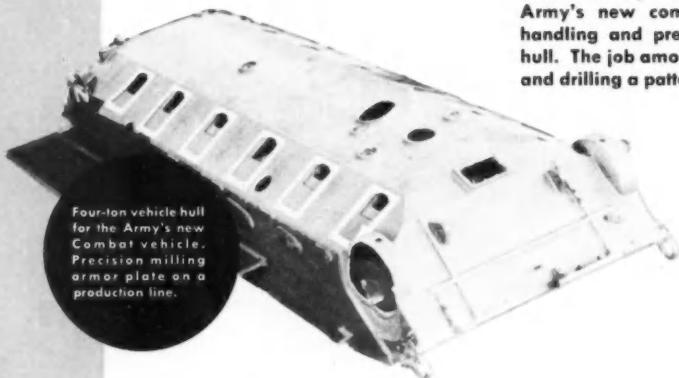
RESULTS ARE UNIFORM. Burrs and sharp edges are removed uniformly. Every gear tooth has smooth, uniform rounded edges. Surfaces are blended.

INVESTIGATE IT TODAY

for your problems. Users report time savings ranging from 20% to 1570% with the Osborn Work Holder Brushing Lathe. Let us demonstrate what it can do for you!

Problem...

HOW TO MASS PRODUCE HEAVY VEHICLE HULLS...



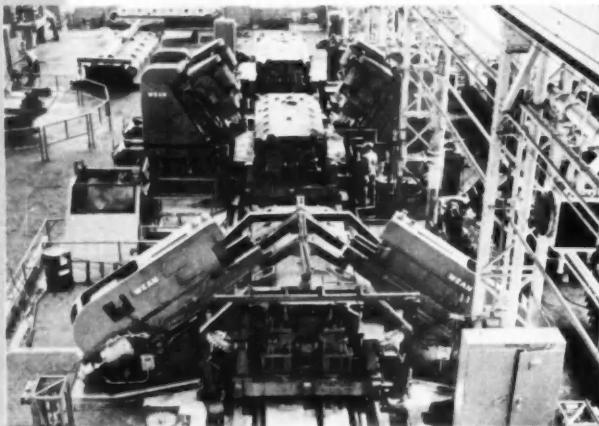
Four-ton vehicle hull for the Army's new Combat vehicle. Precision milling armor plate on a production line.

When Massey-Harris took on the business of making the Army's new combat vehicle they had to contend with handling and precision working the four-ton armor plate hull. The job amounted to milling six suspension slope pads and drilling a pattern of holes in each, profile mill the face of the final drive adaptor casting, rough and finish ream the rear idler opening and drill and tap four mounting holes. All this is to be done on the underside of the hull.

Massey-Harris first considered standard machine tools, but after conferring with Wean Equipment engineers decided the most efficient, quickest and best method would be a complete line, especially built to do the job.

Solution...

UNIQUE TRANS-CAR MACHINING LINE DESIGNED AND BUILT BY WEAN SPEEDS PRODUCTION, REDUCES HANDLING...



Overall view of Wean Line that effected tremendous savings in producing giant hulls.

Wean could iron out the details and build the line in 8 months, as against a 3-year wait for some of the conventional machinery that would be needed. And the line would be adapted to the job, rather than trying to make standard equipment perform a job for which it wasn't exactly suited. The cost of the special line was no more than what would be needed to purchase the conventional machinery to do the job, yet the efficiency of the special line meant tremendous savings after operations got underway.

The Wean line is composed of three main machining stations. The hull is lowered upside down onto a unique, self-propelled fixture car that will carry it the 150-feet required to complete the three operations. The car is powered by a DC drive motor. It runs on two rails, picking up power from a third.

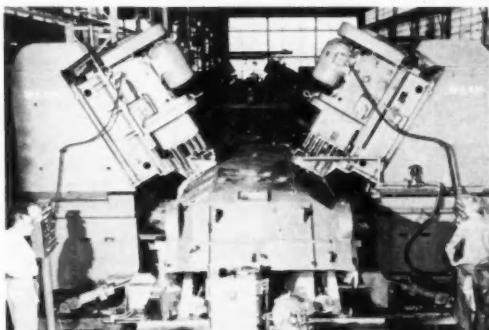
After loading the hull the operator drives the car from a special platform into the first operation which is milling the six suspension slope pads. By simply pushing a button the operator indexes the hull and the milling begins automatically. Six indexings are required.

Milling through, the operator drives the car to the second station where a pattern of holes is drilled into each pad. Special pivoting spindles enables the machine to drill three separate patterns. Five indexings are required on this operation . . . all controlled by automatic push button.

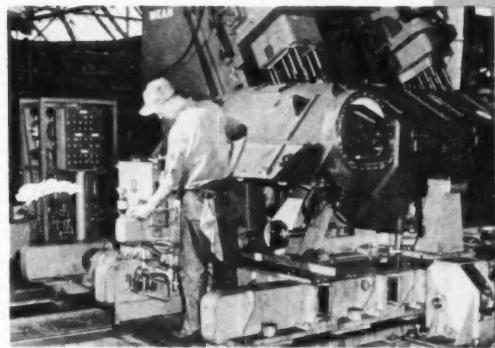
Next is what Wean calls the "Boring Station." Here the face of the final drive adaptor casting is profile milled, the rear idler opening rough and finish reamed and four mounting holes drilled and tapped. Special quick-change chucks help speed the operation here.

After this operation the car moves off the line where an overhead crane lifts the hull from the car. At present it requires but 2 hours to complete a hull, a speed which can be even further reduced when the occasion demands.

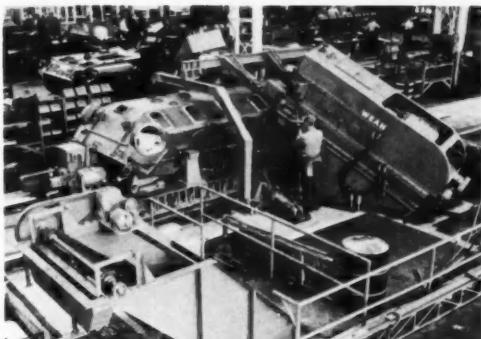
Wean Equipment is one of the nation's foremost organizations devoted to designing and building special machinery for industry. If you have a problem that requires "something special," be sure to let Wean know. Like Massey-Harris you'll find it's the surest and most inexpensive way to soundly engineered performance-proved solutions.



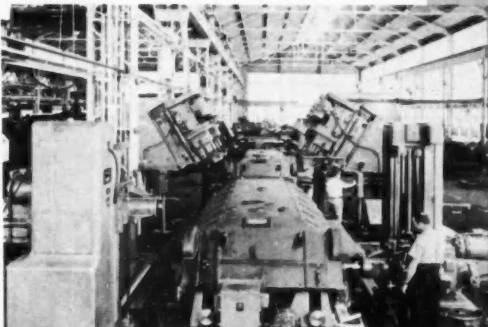
Drilling operation. Beneath the floor a coolant system with magnetic chip separator.



Unique trans-car that carries hull from station to station.



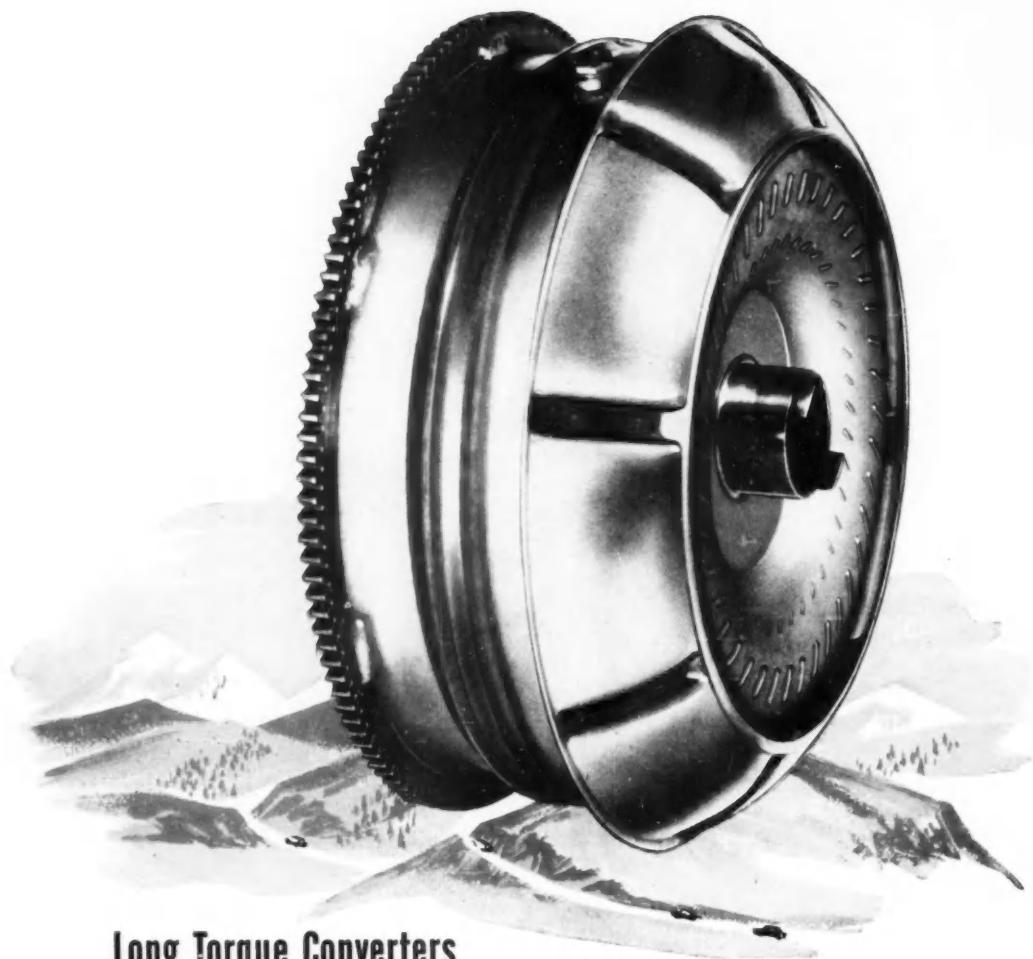
Milling operation. Dry cutting with carbide cutters. Air jets remove chips.



Boring operation. Drills, taps and reamers are of high speed steel. All operations are automatic.

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Long Torque Converters for Smooth Power Transfer

Power moves smoothly through Long torque converters.

They give velvet-smooth pickup and infinitely variable torque multiplication.

Designed for direct air-cooling, our converter helps you simplify your transmission system.

You get an economical package . . . we achieve low-cost production by fabricating
the assembly units almost entirely from stampings.

LONG MANUFACTURING DIVISION
Borg-Warner Corporation
DETROIT 12, and WINDSOR, ONT.



Carburizing Furnaces

(Continued from page 82)

The furnace is then loaded and the lid seal checked for leaks. The timers are set while the furnace is below 1100 F and then the control pointer is set at 1560 F and the furnace is allowed to heat up.

When 1200 F is reached, the super purge (400 cfm RX gas) comes on for one and one-half hours, after which the RX gas is automatically cut back to 175 cfm. When 1560 F is reached the furnace is held at this temperature for one and one-half to two and one-half hours to equalize the heat throughout the load. At the end of this equalizing period, the temperature of the furnace is raised to 1700 F and the carburizing gas (50 cfm) turned on. Twenty-three hours are used in carburizing, then the natural gas is shut off leaving 175 cfm RX gas only in the furnace. The material is held for two more hours at 1700 F in its diffusion period.

After the diffusion period the furnace is cooled down until recorder reaches 1050 F with 175 cfm of RX gas continuing to flow into the furnace. After cooling down to 1050 F, the furnace heating tubes are re-fired until the recorder temperature reaches 1250 F, so as to prevent an explosion when the lid is opened. The charge is then pulled, and disassembled at the cooler and each section is loaded under the hood and cooled to room temperature. It is pushed down the conveyor where the section is loaded on a transfer dolly and moved to either hardening furnace.

The bushings are then loaded into a 12 groove hardening furnace and the empty section returned to storage or the bushing turning machine for further loading. The entire cycle requires 33 hours. Case depth of the bushings averages 0.090 in.

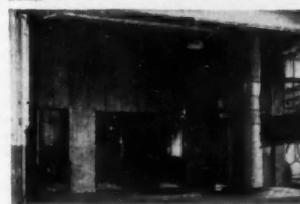
Caterpillar Tractor Co. orders steel from the mills for the bushings according to its own schedule of specifications. After the cold drawn tubing arrives at the Peoria Plant, it undergoes metallurgical tests to determine the complete chemistry of the steel, its response to carburizing, the A.S.T.M. grain size, normality of the grain, and cracks and seams in the tubing. If accepted by the metallurgical laboratory the tubing is rough cut to length, the bores broached, and the outside diameter turned on specially designed vertical lathes. The parts are then carburized and hardened, finished ground to length, and checked

FINISHING SYSTEMS

ask the Engineers...



These photographs of SCHMIEG finishing equipment recently installed in the ultra-modern plant of a large manufacturer of kitchen equipment and other metal specialty items.



Above is SCHMIEG air supply equipment located in the building penthouse. During operation, doors in equipment enclosure are closed. Stack and fan is one of five stacks from spray booths on the floor below.



Schmieq INDUSTRIES INC.
Engineers & Manufacturers

*Write for folder giving partial list of users.

for length, bore and outside diameters.

Before carburizing, a 7/16-in. square by three-in. long standard test piece of similar steel is loaded in each section of the basket in the center of the inside diameter of the bushing in the center of the section. These test pieces are removed, hardened, and broken in two, after the carburizing cycle is completed. One half of each test piece is then etched in a 10 per cent nital solution and the case depth is accurately read to 0.40 per cent carbon on a special instrument.

composed in part of a microscope, a traveling holder and a 0.001 in. calibrated indicating gauge. The ease and simplicity of this Caterpillar-designed instrument will allow any two people to read within 0.002 in. of each other's results.

If the case depth is within the specifications required, the load is then released for hardening. During all three work shifts the furnaces are constantly being checked to insure quality carburizing. Dew points are taken with an Alnor Dew Pointer. A complete gas analysis of all units and

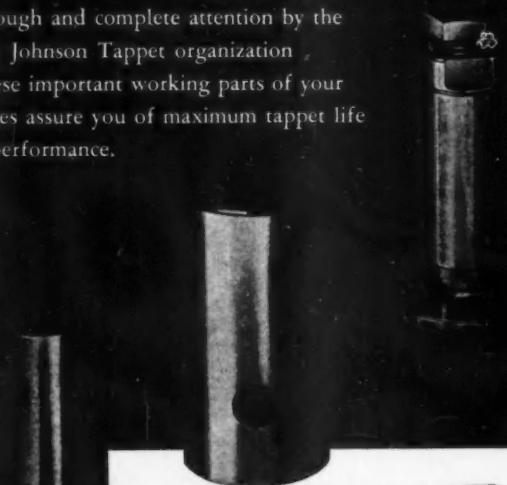
furnaces is taken as often as deemed necessary. Step carbon bars are run once a month as a secondary check on carburizing furnace performance.

A typical analysis of a bar carburized with a load of large bushings is as follows: (The steps are taken in 0.005 in. increments for the first four steps, then 0.010 in. increments thereafter.)

| Step | Depth from Surface (in.) | % Total Carbon |
|------|--------------------------|----------------|
| 1 | 0.005 | 1.10 |
| 2 | 0.010 | 1.06 |
| 3 | 0.015 | 1.06 |
| 4 | 0.020 | 1.02 |
| 5 | 0.030 | 0.98 |
| 6 | 0.040 | 0.97 |
| 7 | 0.050 | 0.98 |
| 8 | 0.060 | 0.99 |
| 9 | 0.070 | 0.99 |
| 10 | 0.080 | 0.99 |
| 11 | 0.090 | 0.99 |
| 12 | 0.100 | 0.99 |

JOHNSON *Tappets* are made by Tappet Specialists

Thorough and complete attention by the entire Johnson Tappet organization to these important working parts of your engines assure you of maximum tappet life and performance.



SELF LOCKING TAPPET SCREW

Originated by Johnson this diaphragm type Self Locking Tappet Screw is operating successfully in millions of cast iron and steel tappets.



"Tappets Are Our Business"

JOHNSON **PRODUCTS**
INC.
MUSKEGON, MICHIGAN

International Harvester Unifies Facilities

(Continued from page 49)

as low as minus 70 F. The cold room is designed to hold temperature to minus 40 F with a 200-hp engine operating with wide open throttle.

Axles and transmissions are treated the same way as engines. Facilities include a 300-hp and 150-hp torque converter and transmission dynamometer, a 300-hp axle dynamometer, and a Prony brake roll-test dynamometer for shock load tests. Two, 20-hp dynamometers are used for friction and power determination, as well as performance, on the smaller power-driven components.

A unique feature is a large test room which will house a 300-hp electric chassis dynamometer capable of taking an entire truck and its cargo weight. This multiple-roll test machine, scheduled for installation in the near future, will accommodate vehicles with one, two, or three driving axles.

Four major sections compose the physical and electrical laboratories which test and develop all components except engines, axles, and transmissions. These include: components laboratory, electronics laboratory and instrument room, stress analysis laboratory, and non-metals laboratory.

These new facilities are so extensive as to defy condensation. Consequently, this article aims at providing a perspective through the medium of a sampling of major facilities, illustrated here.



BROACHES

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embody all the accumulated experience of our 50 years as pioneers in the art of broaching. This valuable "know-how" is put at your disposal every time you send us an order or an inquiry.

Being the world's largest manufacturer of broaching machines and broaches, it is of

course to be expected that our facilities for producing broaches of any size or shape, in any quantity, cannot be equalled.

Recent plant expansion has still further increased our capacity to produce broaches . . . although we are already the largest producer of broaches in the industry!

It is definitely to your advantage, when you need broaches, to look to the leader . . . look to LAPONTE!

Send for our brochure on broaches. Ask for Bulletin B-10

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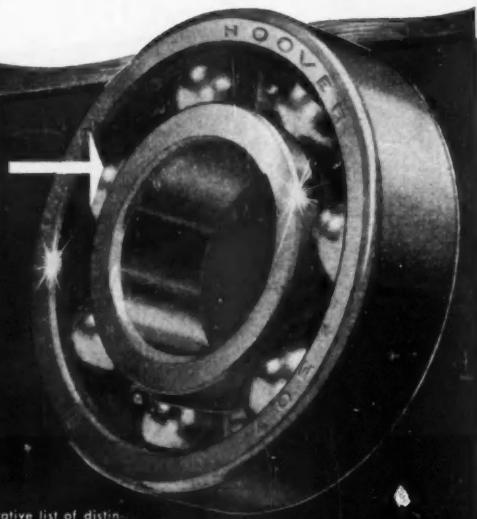
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30% GREATER LOAD
AMAZING QUIETNESS**

The Aristocrat of Bearings

HOOVER BALL AND BEARING CO.
ANN ARBOR, MICHIGAN

Statistical Quality Control

(Continued from page 40)

produce the mean pressure of 70 psi.

Since the Pythagorean method of computing tolerances states that tolerance total =

$$\sqrt{(\text{Tol}_A)^2 + (\text{Tol}_B)^2}$$

Then the total tolerance is

$$\sqrt{(.001)^2 + (.001)^2} = .00014$$

With the engineering mean of 0.0020 in. and with plus and minus 0.0007 in. the clearance tolerance is 0.0013 in. to 0.0027 in.

The lower tolerance 0.0013 in. compares to 0.0014 in. and is acceptable. However, the 0.0027 in. is 0.0007 in. inside our ideal upper tolerance of 0.0034 in.

This means that too much of the tolerance is wasted in machining, and that the random assembly of these pumps will be dangerous.

Comparing graphically the given engineering distributions with the statistical quality control calculated ideal distribution, may show this more clearly in Fig. 8. Two faults exist in this engineering distribution: (1) Too high a pressure; and (2) the pressure is distributed in too narrow a dispersion.

The solution was a simple one. The tolerance "B" was opened up 0.001 in. by adding this to the high side—not splitting it on the low and high side of the dimension.

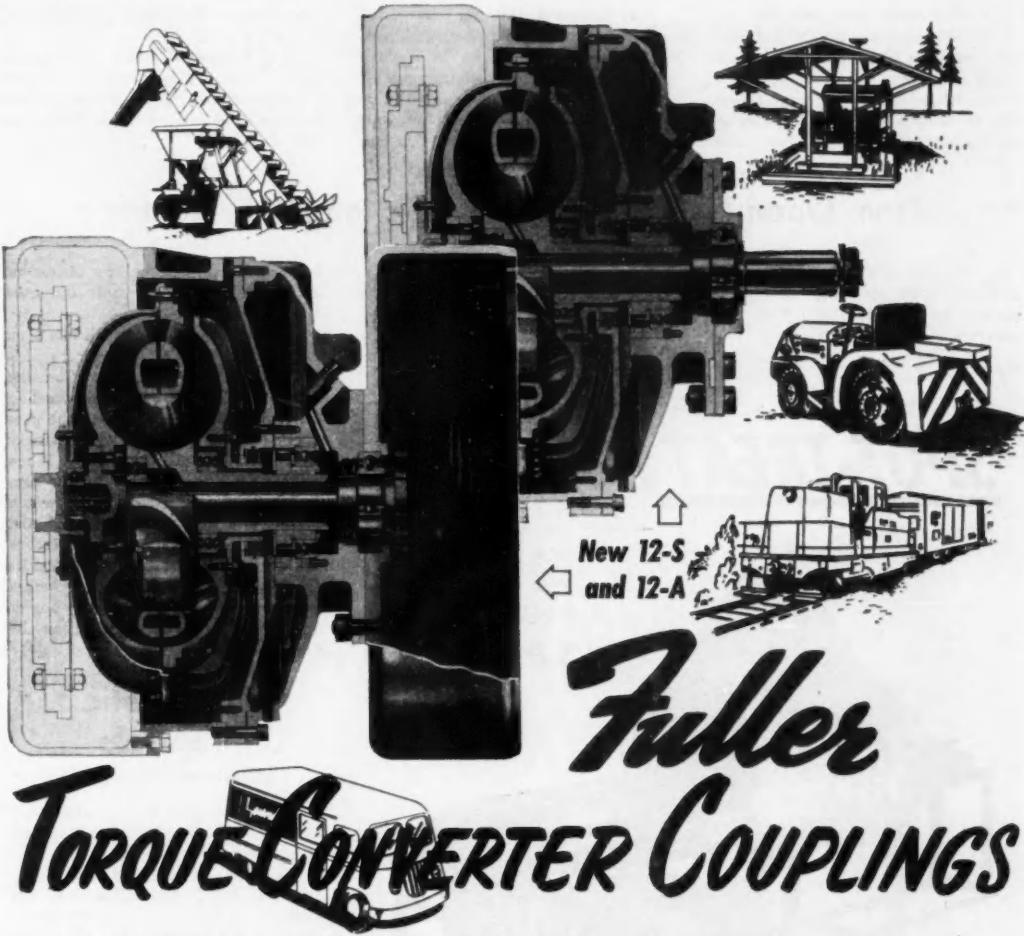
In changing this tolerance the computation shows: Tolerance total = $(.002)^2 + (.001)^2 = .000224$ or $\pm .00012$ and the mean clearance now comes to 0.0025 in. which is very near to the ideal of 0.0024 in.

The new distribution compared to the ideal shows, in Fig. 9, that the lower limit of 0.00138 in. practically coincides with the ideal 0.0014 in. The upper limit, however, exceeds the ideal. The number of assemblies which lie between clearances of 0.0034 in. and 0.00362 in. was calculated from the area under the normal curve. It proved to be 0.6 per cent which can be considered negligible.

Some quite impressive results from this analysis, and subsequent changing of dimensions and tolerances, were gained:

(1) Eased difficulty in machining operations because of greater tolerances. This increased production of acceptable parts and drastically reduced rework and inspection.

(Turn to page 92, please)



Fuller TORQUE CONVERTER COUPLINGS

Designers now have at their command a new torque converter coupling for engines delivering maximum torque of 180-225 foot pounds. Fuller's new 12-A and 12-S converter coupling drives have proved highly successful in delivery trucks, fork-lift trucks, tow trucks, hoists, locomotives, loaders and other installations where start-and-stop, heavy load pickups are hard on engine, gears, drive lines, axles and tires, and tiring on operators.

Design these advantages into your new equipment....2.1 to 1 torque multiplication....elimination of shock loads and stall-

ing....greater operator ease. Available with *spined* output shaft (12-S) or with *flanged* output shaft and SAE No. 3 flywheel housing (12-A). Multiplication 2.1 to 1 at stall for smooth starting and hard pulling. Stator mounted on over-running clutch which permits automatic change to fluid coupling operation for economy in normal running. Maximum diameter of fluid circuit 12 $\frac{3}{4}$ ". Designed for engine speed of 2000-2200 and higher.

Ask for an analysis by our engineering department for your application, giving engine torque and hp. curve.

- SPEEDS WORK
- SMOOTH POWER
- PREVENTS SHOCK
- PLEASES OPERATORS
- PRESERVES EQUIPMENT



FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

(Continued from page 90)

(2) Eliminated work of two men who selective fitted pump assemblies—12¢ per pump.

(3) Removed 100 per cent inspection in favor of control charts on the machining operations—5¢ per pump.

(4) Removed 100 per cent functional test of completed assemblies—5¢ per pump.

(5) Achieved total savings per assembly of 22¢ per pump plus the intangible figure gained in (1) above.

(6) Field difficulties, for this con-

dition, have definitely disappeared.

The foregoing article is from a paper presented by the author at the Seventh Midwest Quality Control Conference held last month at Indianapolis, Ind.

From Open Fields to Tank Production in 18 Months

(Continued from page 37)

Serrated ends of bars are crush ground on Thompson and Van Norman units.

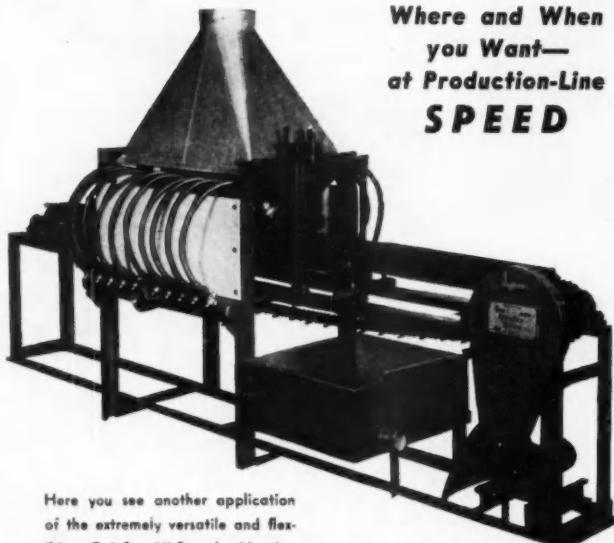
Two Gogan machines are used to preset the bars. The finished bar is then covered with an extruded Neoprene sleeve 84 in. long. This sleeve

is slipped over the bar by means of a Chrysler engineered air operated fixture.

An interesting item which has been designed by Chrysler engineers is a unit for putting the tracks on the tank. Consisting of three winches, the unit pulls the tank from the production line onto the two sets of tracks which are laid flat on the floor. When the tank is approximately in the center of the tracks, the center winch pulling the tank is disconnected and the cables from the two outer winches are attached to the rear of the tracks over the tank's bogies. The winches then pull the tracks over the bogies until the front and back can be joined.

SPOT-TREAT

Where and When
you Want—
at Production-Line
SPEED



Here you see another application of the extremely versatile and flexible G.A.S. Hi-Speed Heating Method as employed for Flame hardening track shoes. 120-12" shoes treated per hour. Rapid heating minimizes scale formation with resulting cleaner job. Unit fits into any production line. Two rows of High Speed Zig-Zag Burners provide maximum heat concentration

on area to be heated. A Furtak Gas-Air Mixer supplies the necessary gas-air mixture to the burner manifolds. Spray quench is mounted at end of burner zone. Let us show you how the G.A.S. Hi-Speed Heating method can speed up your operations.



GAS APPLIANCE SERVICE, INC.

Industrial Gas Supply

1221 WEBSTER AVENUE • CHICAGO 14, ILLINOIS

Automatic Controls

(Continued from page 45)

plant at Louisville, Ky., installed such automatic stand-by equipment to furnish emergency lighting.

The Reynolds Metals Co. at Gregory, Tex., has installed Synchro-Start controls with a Leroi engine generator set for emergencies. A similar setup also has just been installed in the company's new San Patricio County, Tex., plant. Carbide & Carbon Co., at Whiting, Ind., has automatic controls on a four-cyl gas power unit — mounted on a common base with a Chicago Pneumatic Tool compressor on a stand-by basis. This will start on failure of plant instrument air supply.

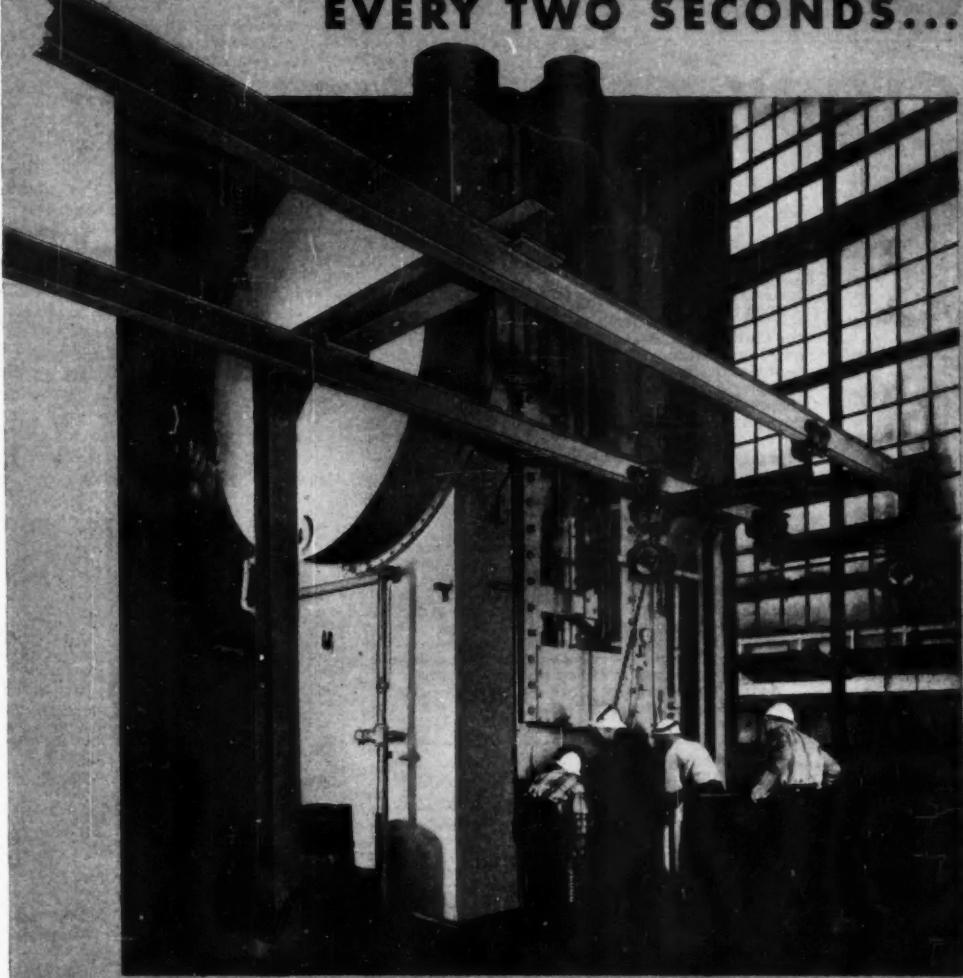
Among other automatic control applications are: gas and oil pipeline booster stations; fire fighting equipment; oil field pumping engines; hospitals; and radio stations.

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are always well informed

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...that's how this new forging press, part of the Kropp expansion program, operates. Additionally, we have put into operation three drop hammers of 40,000, 20,000 and 16,000 lb. capacities, new modern heat treating furnaces, additional die sinking machinery . . . until our equipment and facilities for supplying your forged parts are unsurpassed by anyone. If you need forgings—one or a million—of steel, titanium or other alloys—call on Kropp, "America's Number One Forge Company".

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Count on Clark for Cutting Costs

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You'll find this sign of your nearby authorized Clark dealer under "Trucks—Industrial" in the Yellow Pages of your 'phone book.



through EFFICIENCY...

No matter what your product may be, it's a safe bet that Clark Materials Handling Equipment can lift it, move it, load it or stack it better, faster, and at lower cost. That's saying a lot . . . but ask any Clark user. He'll tell you that Clark cuts the cost of handling. For example, "The average savings of four large worsted mills that are using (Clark) equipment is \$400.00 a week."—quote from article in *TEXTILE WORLD* by M. J. Korosky.

through USEFULNESS...

There's no end to the usefulness of the Clark line of fork-lift trucks, powered hand trucks and industrial towing tractors . . . special attachments facilitate quick switching from one job to another . . . no idling while "waiting for work" . . . odd sizes and shapes handled easily and safely . . . your choice of power types—gas, diesel or electric battery.

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Clark Equipment saves time . . . multiplies manpower . . . reduces handling time. Clark high-tiering increases usable warehouse space . . . cuts storage costs. And the many important Clark features plus Clark precision engineering insure remarkably low operating costs.

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Clark Equipment gives service . . . years of it. But remember, the equipment that *gives the most service* is that which *gets the best service*. That's why you'll always find a Clark Service Dealer near you capable of handling the most complex repair or overhaul job . . . with a line of genuine Clark replacement parts . . . and a crew of factory-trained experts to serve you . . . promptly.

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New Products

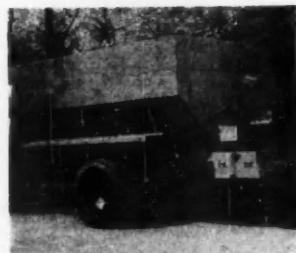
For additional information please use postage-free reply card on page 65

(Continued from page 64)

Cinder Spreader

Recently announced is a cinder spreader designed to combat ice and snow on streets, highways, plant grounds, etc. The truck-mounted unit is said to spread full-road or half-road width at one pass and to be controlled from the cab by a single driver-operator or manually.

The conveyor and spinner mechanisms are powered by a regular truck-transmission type power take-off, through a protected drive line and universal joint arrangement. A heavy-duty gear-reduction box completes the basic speed to power change-over.



A preheater uses the truck engine's exhaust heat to prevent large chunks of moist or wet cinders from forming next to the body conveyor chain. This is said to eliminate load hangup due to freezing conditions and assure a uniform spread of small even-sized cinders.

The semi-sloped hopper is available in standard sizes of five and nine cu yd., with 11-ft length, to give optimum gross load on front and rear tires. Other capacities and lengths are available on special order. *Hercules Steel Products Corp.*

Circle P-8 on page 65 for more data

Tubeless Tire

Now on the market is a tubeless passenger car tire that is reported to offer longer mileage, improved riding qualities, and protection against blowouts. *B. F. Goodrich Co.*

Circle P-9 on page 65 for more data

(Turn to page 164, please)

When a high-strength steel is needed

for severe cold-formed shapes like these bumpers

Specify →



and get all of the
requirements
of SAE 950



When a material meeting the requirements of the high-strength, corrosion-resisting steels of SAE Specification 950 is used for severe cold-formed shapes, it will pay to investigate N-A-X HIGH-TENSILE steel—the low alloy steel with built-in formability. Its finer grain and higher hardness also result in brighter luster when ground and polished for plated parts.

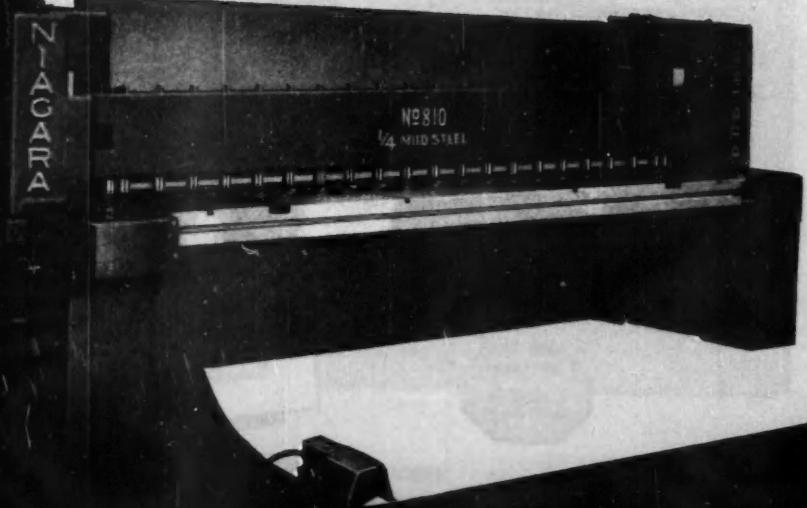
GREAT LAKES STEEL CORPORATION
N-A-X Alloy Division
Ecorse, Detroit 29, Mich.

NATIONAL STEEL CORPORATION



NIAGARA SHEARS

at General Sheet Steel Co., Detroit, Mich.



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after shearing
thousands of tons
of steel
of all kinds

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THE RECORD!**

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Shears are designed for
HIGH VOLUME SHEARING
ACCURACY
DEPENDABILITY
LOW MAINTENANCE
COSTS

Write for Bulletin 69

SERVICE RECORD

6

*Niagara Shears
1945-1952*

*Total Cost of
Repairs*

*less than \$20 per shear
per year*

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Dealers in principal U. S. cities and major foreign countries

Huge Amphibious Vehicle

(Continued from page 54)

36-41. These giant tires, manufactured by the Firestone Tire and Rubber Co., are the largest presently commercially available. Equipped with a hub inflation system which is controlled from the cab of the vehicle, tire pressures can be adjusted by the driver at any time.

Each wheel of the BARC is separately powered by an individual General Motors type 6-71, 165 hp Diesel

engine which transmits its power through an Allison Torqmatic transmission, and two angle drives with planetary gear reduction from which the final drive is put into a ring gear mounted at the very edge of the wheel. The shifting of all four engines simultaneously is achieved through the use of Westinghouse synchronized air controls. Perfex Corp. designed and built the engine cooling radiators.



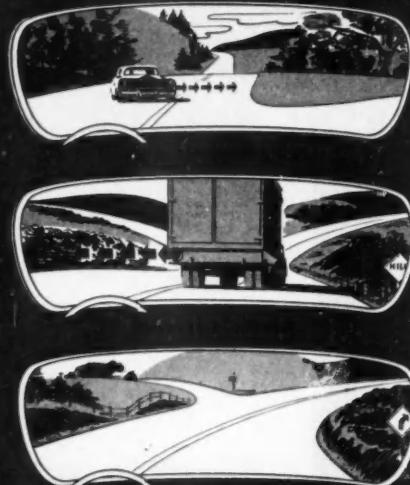
Tires for the BARC are size 36 x 41, largest production tire available

The steering mechanism consists of two 30-ton hydraulic rams mounted atop vertical king posts which are attached to the steering wheel. In the cab, the driver may steer in any one of three possible ways simply by placing a single control in the desired position. First, "normal" steering—rear wheels are locked in a straight position, and only the front wheels are movable. Secondly, "full" steering—both front and rear wheels move but at opposite angles. Lastly, crab steering—both front and rear wheels are steerable but move in the same direction. Vickers, Inc., supplied the hydraulic valves and pumps.

When afloat, the BARC is driven through the water by twin propellers located under its stern. Each screw is powered by two engines. Each pair of engines drives into a gathering box, which, through a Twin-Disc fluid coupling, transmits the power to a marine reverse gear and then out to the propeller. The advantage of using this principle is that the engines do not have to be accurately synchronized for speed. An eductive system for bilge pumping capable of putting water at 4000 gpm over the side is also provided. These pumps are driven through a power take-off from the main drive shaft.

To facilitate the discharge of cargo, the BARC is equipped with a hydraulically-operated bow ramp. In addition, there is a stern winch also, driven through a power take-off, which has a line-pull capacity of 50,000 lb. Other features incorporated into the BARC design include a flood-lit cargo compartment, storage lockers built into the bow's stern cheeks, and a flooding-type carbon dioxide fire-extinguisher system which can be controlled either from the driver's compartment or from outside the vehicle. A crew of three operates the vehicle.

S-A-F-E-T-Y



Only the Tung-Sol Signal Flasher provides this three-way warning for automotive uses—ahead—behind—and on the instrument panel. The important instrument panel pilot light tells the driver his signals are operating, or, by not flashing, warns him of a circuit failure.

More than 13,000,000 Tung-Sol Signal Flashers have been used and they usually outlast the cars they're on.

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Tung-Sol Makes:

All-Glass Sealed Beam Lamps,
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QUALITY, PRODUCTION-engineered EATON Springtites and Sems (bolts or thread-cutting screws with pre-assembled Reliance spring lock washers or multitooth washers) cut assembly motions for hundreds of users. In fact, in actual use, they cut these assembly motions from 8 to 3! Here's real economy on your assembly line operations. All the engineering data and samples you require for a trial test can be obtained by writing us today.



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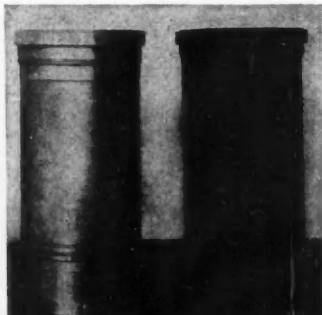
(Advertisement)

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AMBLED ACP CHEMICALS PENNA.

Technical Service Data Sheet
Subject: PROTECTING FRICTION SURFACES
WITH THERMOIL® GRANODINE®

INTRODUCTION

Fabricators and product designers, particularly in the automotive field, are aware that even highly polished surfaces under friction weld, gall and score. One of the most inexpensive and practical methods of preventing this is to coat the metal to prevent metal-to-metal contact. With cast iron or steel, the "Thermoil-Granodine" manganese-iron phosphate coating provides a wear-resistant layer of unusual effectiveness.



Thermoil-Granodizing greatly prolongs the life of parts subject to friction. It protects the surface of products like the diesel engine liners shown above and the many moving parts of automobiles and other machines. "Thermoil-Granodine" with its remarkable lubricating properties is particularly valuable in these and similar applications because of its ability to retain oil and maintain lubrication under high pressures and high velocities. This ACP wear-proofing chemical not only permits rapid break-in without scoring, scuffing and welding but also reduces subsequent wear on friction parts.

"THERMOIL-GRANODINE" PROTECTS RUBBING PARTS

Thermoil-Granodizing removes "fuzz" from ferrous metal friction surfaces and produces a coating of non-metallic, water-insoluble manganese-iron phosphate crystals which soak up and hold oil as bare untreated metal cannot do. The oiled crystalline "Thermoil-Granodine" coating on piston rings, pistons, cylinders, cylinder liners, cranks, cam-shafts, gears, tappets, valves, spiders and other rubbing parts, allows safe break-in operation, eliminates metal-to-metal contact, maintains lubrication and reduces the danger of scuffing, scoring, welding, galling and tearing of the metal. The work to be protectively treated is merely Thermoil-Granodized and oiled, usually with a soluble oil.

"THERMOIL-GRANODINE" MEETS THESE SPECIFICATIONS

| SPECIFICATION NUMBER | SPECIFICATION TITLE |
|---|---|
| MIL-C-16232 Type I | Coatings — phosphate; oiled, slushed, or waxed (for ferrous metal surfaces) and phosphate treating compounds. |
| AN-F-20 (See also U.S.A. 3-213) | Finishes, for electronic equipment. |
| U.S.A. 57-0-2C Type II, Class A | Finishes, protective, for iron and steel parts. |
| U.S.A. 51-70-1 Finish 22.02, Class A | Painting and finishing of fire control instruments; general specification for |
| M-364 | Navy aeronautical process specification for compound phosphate rust-proofing process. |



WRITE FOR FURTHER INFORMATION ON
"THERMOIL-GRANODINE" AND ON YOUR OWN METAL
PROTECTION PROBLEMS.



**MAGNESIUM
ASSOCIATION**

(Continued from page 74)

Since the primary purpose behind the application of magnesium to the car has been to reduce cost, all consideration has been devoted to die-castings and permanent mold castings been obtained as iron sand castings in a form, not only from a standpoint of part cost but also because of savings in machining resultant from coring and close dimensional control in the casting operation. The most logical parts for magnesium were, of course, those which had always been obtained as iron sand castings or zinc die castings. In the case of the cast iron, considerable savings in the number of machining operations could often be realized while in the case of the zinc die casting the advantage was primarily due to a wide differential in initial material cost. Thus we find that parts of the following type are in production or have been used in production: clutch housings; torque converter housings; transmission parts; oil seal plates; steering column shrouds; steering column brackets; fan spacers; convertible folding top pillars, rails, and hinges; instrument panel housing and bezels; and generator end plates.

Numerous other parts of a similar nature are released but have not been placed in production to date. Since the largest of these parts weighs approximately 10 lb in magnesium it can be seen that the application of magnesium to only a few parts can result in a rather large total consumption of metal by the automotive industry. Keeping in mind, therefore, the types of application under discussion, consider some of the service and fabrication experience which has resulted.

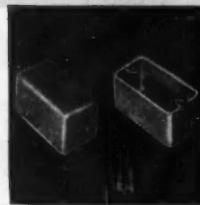
Corrosion

Considerable doubt was originally present as to the ability of magnesium to withstand the effects of the chloride road salt used throughout the winter in cities such as Detroit, Cleveland, etc. Results after approximately three years' service clearly indicate that corrosion of the magnesium, under exposure encountered by road salts and in locations such as the underside of the car, is not of sufficient severity to restrict its application.

Service test data were also obtained on parts exposed to action of (Turn to page 105, please)



ACCURATE



Perhaps you don't think of accuracy as an important factor in the production of stampings like those illustrated here—but maybe you should. Accuracy in press operation is more than a matter of holding tolerances in the work. Inaccurate operation means unnecessary wear on dies, and that costs money. The fact that Clearing presses were chosen by this manufacturer of electrical equipment is significant because it demonstrates a real understanding of the elements of cost. If you consider all the factors, you will choose Clearings, too.

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HAMMOND INVISION, HAMILTON, OHIO

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

Pan American Race Highlights

(Continued from page 33)

official rules established therefor. First place in the sports division was won by Karl Kling in a Mercedes-Benz. Hermann Lang, driving another Mercedes-Benz, was second. John Fitch, also driving a Mercedes-Benz, set a record on the final run of 231 miles when he covered the distance in one hour, 41 minutes. He was dis-

OFFICIAL RESULTS OF PAN-AMERICAN ROAD RACE

| STOCK CAR DIVISION | | | TOTAL DISTANCE: 1834 Miles | |
|--------------------|--|---------------------|----------------------------|----------------|
| Position | Driver | Make of Car | Total Elapsed Time | Prize Money |
| 1 | Chuck Stevenson, Lynwood, Calif. | Lincoln | 21:16:38 | \$11,628 |
| 2 | John Mantz, Los Angeles | Lincoln | 21:18:09 | \$5,814 |
| 3 | Walter Faulkner, Long Beach | Lincoln | 21:20:09 | \$2,807 |
| 4 | Capt. Bob Kerf, Dayton, Ohio | Lincoln | 21:25:06 | \$1,744 |
| 5 | Reginald McFee, Rochester, N. Y. | Chrysler | 21:43:00 | \$1,162 |
| 6 | C. D. Evans, El Paso | Chrysler | 21:54:55 | \$561 |
| 7 | Marshall Teague, Daytona Beach | Hudson | 22:08:00 | \$561 |
| 8 | Murr Dean Kirby, Tampa | Cadillac | 22:17:50 | \$561 |
| 9 & 10 | Jean Trevoix, Mexico Tie (Allen Heath, North Ridge, Calif.) | Packard Chrysler | 22:35:00 22:35:00 | \$561 \$561 |

Others finished in this order:

Pierro Taruffi, Oldsmobile; Resende Dos Santos, Oldsmobile; Otto Becker Estrada, Packard; Felix Cerdá Loxa, Oldsmobile; Fernando Maciel, Packard; Alfredo Herrera, Cadillac; Owen Gray, Chrysler; Arturo, Cadillac; Owen Gray, Frank Mundy, Oldsmobile; Abelardo Diaz, Hudson; Bob Christie, Nash; Jorge Limon Escalante, Packard; Manuel Luis Meneses, Oldsmobile; Fernando De Leeuw, Mercury; Emilie Chafardet, Hudson; Guillermo Giron, Cadillac; Jacqueline Evans, Chrysler; Juan De Agunaco, Henry J.; Enrique Peñiero, Dodge.

Easy Handling on Curves



and Around Tight Corners

This J. I. CASE INDUSTRIAL TRACTOR, equipped with a shoveloader, sets pipelines and backfills after sections are tested and sealed. ROCKFORD CLUTCHES help this rugged unit maneuver handily in close quarters. Let ROCKFORD clutch engineers help your product designers plan versatile power transmission controls for your machines.

ROCKFORD CLUTCH DIVISION, ZODI-WARNER
315 Catherine Street, Rockford, Illinois, U.S.A.



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MAKES IT
WORK

B-W
PRODUCTION
MAKES IT
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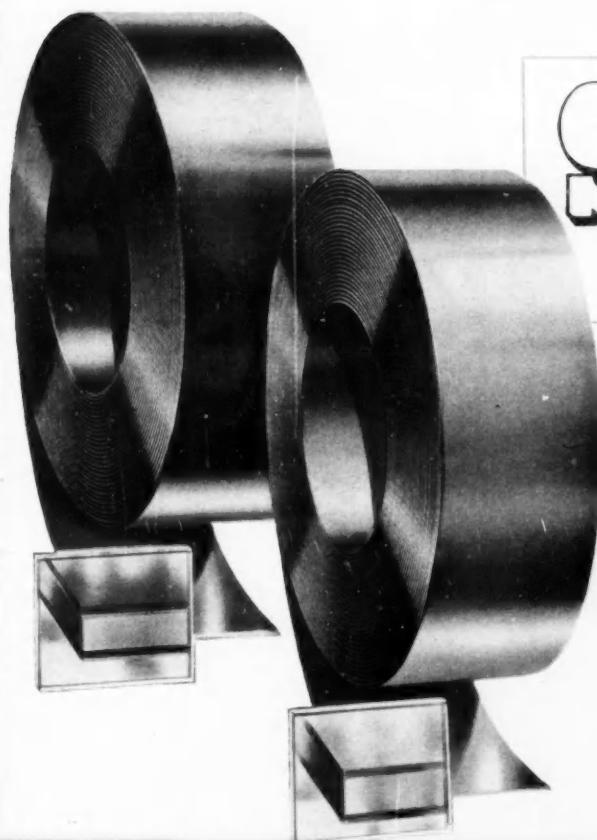
ROCKFORD CLUTCHES



WHILE YOU HELP SAVE

COPPER AND BRASS

FOR DEFENSE



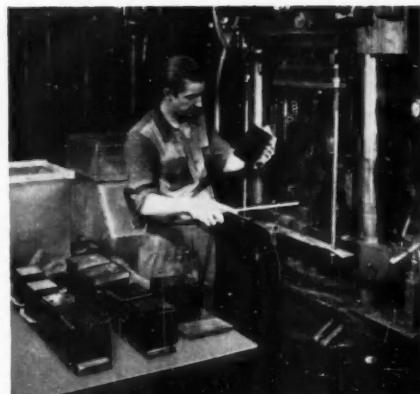
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CLAD METALS

There's a two-way benefit in every coil of SuVeneer Clad Metals: profitable economy for you, and conservation of critical materials for defense.

The *solid* copper or brass on steel represents a saving of 70% to 80% over equivalent gauges of the single non-ferrous metals, and brings the inner strength of steel to your copper or brass product applications. The metals are bonded inseparably—you use your regular fabricating methods with this time-proved product. • Let us cooperate with you.

Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

New source of plastics
for the automotive industry
at United States Rubber Company's
Chicago Die Mold plant



One of the 40 Plunger Transfer and Compression presses in U.S. Rubber's new Chicago Die Mold Plant.



This modern new plant houses the productive facilities and scientific personnel for wider excursions into the field of plastics, in the form of moldings, extrusions and fabrications.

For the automotive industry, this plant will produce plastics molded by injection and compression (transfer or plunger). It has its own mold manufacturing facilities. The equipment is of the most advanced type, and the engineers have at their command the great research stockpiles of the United States Rubber Company. This Chicago Die Mold Plant will supplement the "U.S." plant and laboratory at Fort Wayne serving the automotive industry.

This is the newest unit in the nationwide chain of plants and laboratories which comprises United States Rubber Company.



Other equipment in the plant includes 20 Injection Machines, with controlled mold temperatures.

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UNITED STATES RUBBER COMPANY
MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

MAGNESIUM ASSOCIATION

(Continued from page 100)

corrosive fluids such as coolants and brake fluids. Results clearly indicated that, unless protective chemical treatments or coatings could be supplied, magnesium could not be utilized in such applications.

With regard to painted magnesium castings used in decorative or functional parts such as steering column shrouds, fold top pillars, etc., no instances of undesirable corrosion have been encountered in over two years' productive service.

Stress

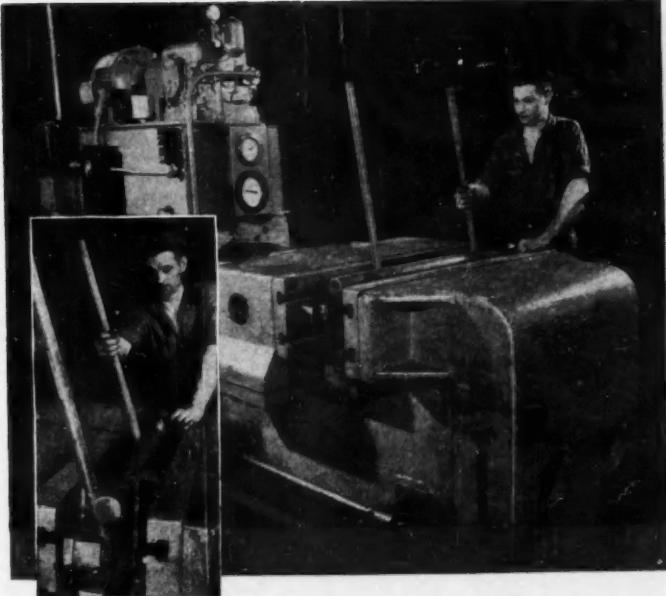
Some of the castings presently released for production must carry high static and fatigue loads. After a considerable period of car testing under the most severe conditions and part testing in the laboratory we have reached the conclusion that magnesium and aluminum can be released as optional materials for a particular design. It has further been found that the design modifications necessary to change a cast iron part to magnesium are not of sufficient magnitude to prevent obtaining the full weight reduction as anticipated from specific gravity comparison. A possible exception to these general statements would be in the case of a part where deflection was the major consideration.

Fabrication

Probably the most important property of which magnesium can boast is that of excellent machinability. After 1½ years experience with production machining magnesium, we can make the unqualified statement that no restriction on the usage of magnesium can be warranted by reason of the fire hazard encountered in machining. Tool life has been excellent, much higher than experienced with any other metal. Finishes have been all and more than expected, and many benefits are anticipated through the eventuality of specialized machines. At the present time, however, some rather important drawbacks exist with regard to machining magnesium as follows:

1. The necessity of using oil coolant for fine cuts rendering disposal of chips difficult.
2. The poor salvage and reclamation status for chip disposal, as compared to aluminum, is costly.
3. Parts are easily distorted in handling, clamping, and chucking.

(Turn to page 108, please)



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FARQUHAR Hydraulic Press

Mercury Manufacturing Co., Chicago, Ill., producers of fork trucks, tractors and trailers, use a 200-Ton Farquhar Horizontal Bulldozer press to make forgings and stampings and to form plates. In operation 8 hours a day, the press does most jobs twice as fast as the mechanical bulldozer used formerly, and better speed control produces better work.

In addition, many pieces of work that used to be farmed out are now done at Mercury—providing better production and quality control, and effecting additional savings of time.

In the operation shown above, high carbon brazed steel is bent quickly and accurately. In other operations, the press forms heads on bolts, legs for caster forms, and bends structural T frames.

Mercury reports very small maintenance costs, and sums up the company's satisfaction with, "It's the best!"

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Send for Free Catalog showing Farquhar Hydraulic Presses in all sizes and capacities for all types of industry. Write to: A. B. FARQUHAR CO., *Hydraulic Press Dept.*, 1523 Duke St., York, Pa.

—A. B. FARQUHAR COMPANY Division of THE OLIVER CORPORATION—

Pan American Race Highlights

(Continued from page 102)

A French Gordoni, a light six-cylinder car, was leading the first day through the mountains but Jean Behra, celebrated French pilot, struck a bridge and was seriously injured the second day out. Many believe the terrific pounding through the mountains beat the Ferraris. The Italian drivers reported serious transmission

OFFICIAL RESULTS OF PAN-AMERICAN ROAD RACE

SPORTS CAR DIVISION

TOTAL DISTANCE: 1934 Miles

| Position | Driver | Make of Car | Total Elapsed Time | Prize Money |
|----------|--------------------------------------|---------------|--------------------|-------------|
| 1 | Karl Kling, Germany | Mercedes-Benz | 18:51:19 | \$17,422 |
| 2 | Hermann Lang, Germany | Mercedes-Benz | 18:28:30 | \$11,028 |
| 3 | Luigi Chinetti, Italy | Ferrari | 18:32:45 | \$6,977 |
| 4 | Umberto Maglioli, Italy | Lancia | 20:11:20 | \$4,661 |
| 5 | Jack McAfee, Manhattan Beach, Calif. | Ferrari | 20:21:15 | \$2,807 |
| 6 | Phil Hill, Santa Monica | Ferrari | 20:33:46 | \$861 |
| 7 | Paco Ibarra, Mexico | Ferrari | 23:14:18 | \$861 |
| 8 | Furat Metternich, Germany | Porsche | 23:18:15 | \$861 |
| 9 | Enrique Ortiz Parada, Mexico | Lancia | 23:32:47 | \$861 |
| 10 | Douglas Evinger, Pusilla, Mexico | Jaguar | 24:37:37 | \$861 |

Note: John Fitch, Stamford, Conn., driving Mercedes-Benz with German team, was disqualified after he finished the final lap, because he accepted help the day before, in making repairs to his car.

trouble going through the mountains.

Attached to many of the sports and stock cars were altimeters. In addition to showing how high the hills and how deep the valleys, they were used also as barometers. The instrument was set at zero when put up at night, and in the morning the pointer told whether atmospheric pressure had increased or decreased. This indicated probable weather conditions within the next 24 hours.

One driver said, "The cars today are 20 years ahead of tires and highways." Tire trouble was costly due to throwing of tread and slashing over rough roads. "I hope we demonstrated the sort of speed that one day will be common on highways traveled continuously," he said.

The drivers agreed that the Pan American road race is soon destined to replace any others, including Indianapolis, as one of the roughest, toughest tests for men and machines.

They pointed out the steep grades, temperature changes, and distance make the Pan American race "the most difficult in the world."

BOOKS ...

ESSENTIALS OF MICROWAVES, by Robert B. Muchmore, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y. Price, \$4.50. Microwave apparatus and its functions are precisely analyzed in this 236-page volume. The author first stresses the physical principles that underlie the operation of microwave devices. His discussion proceeds to include such subjects as: electromagnetic laws of Maxwell, characteristic waves, wave guides and antennas, cavity resonators and filters, typical microwave antennas, waves and electron streams, and grid-control tubes. The basic concepts and applications of klystrons, traveling-wave and multiple-stream tubes, magnetrons, and radar are also included. Electrical noise, microwave radio systems and measurements, relays, and the applications of microwaves in physical research are among the other subjects treated.

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FREE CATALOG

contains valuable engineering information and rivet specifications plus illustrated descriptions of 28 Chicago Automatic Rivet Setters.

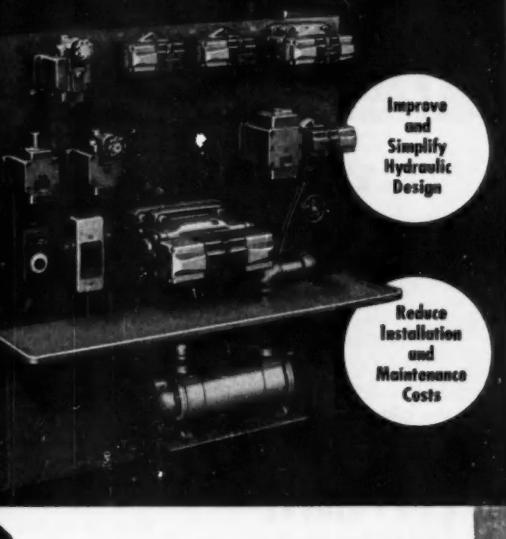
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Branch Factory: Tyrone, Pa.

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921



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MACHINERY INDUSTRIES

(Continued from page 55)

Westinghouse Power Conference

It was learned, while attending the Second Trends of Electric Power in Industry Conference, sponsored by Westinghouse Electric Corp. in East Pittsburgh, Pa., last month, that a committee, headed by W. H. Formhals, manager of Westinghouse's A-C Motor Engineering Section, has been sent to Europe for the purpose of checking on the practices used in building motors abroad. Five technical papers were presented at the conference by Westinghouse personnel.

Speaking on automatic regulating systems, W. R. Harris, manager, Metal Working Section, Industry Engineering Department, stated that the push of competition has forced production operating speeds up to higher rates in an effort to get more production from a given unit. This in turn has resulted in the ever-expanding use of automatic regulating systems to control various processes. Through the use of such systems for higher speeds and continuous processes in the steel industry, the man-hours per ton of steel have gradually decreased and efficiency of operation has increased. Mr. Harris pointed out that at the new Fairless plant of U. S. Steel a total of 58 regulating systems are being supplied to control 61,350 hp.

For designing industrial regulating systems, Westinghouse has been making use of an analog computer—called the Anacom, according to J. T. Carleton, supervisor, Analog Computer Operations, Industry Engineering De-

(Turn to page 112, please)

MAGNESIUM ASSOCIATION

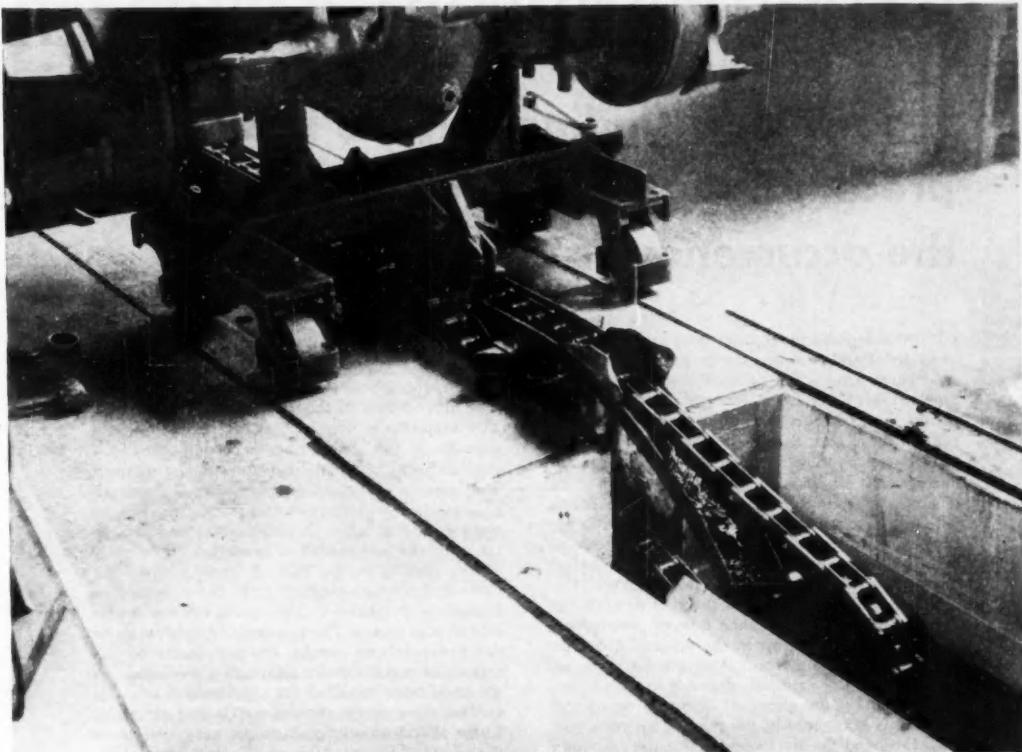
(Continued from page 105)

It is recognized that these conditions are due to lack of familiarity and to the rather small volume of metal being processed in the automotive industry.

We sincerely believe, as a result of experience to date, that no serious objections have been encountered which would restrict the application of large volumes of magnesium to the automobile.

(Turn to page 123, please)

no ONE chain serves every purpose



A 260 foot-long Link-Belt endless chain conveyor, consisting of Class C combination malleable iron and steel conveyor chain, on a motor truck assembly line. Conveyor speed is adjustable through use of Link-Belt variable speed drive.

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Link-Belt offers no single "cure-all" chain to handle every job. From the most complete line of chains and sprockets—we can recommend the best type to fit your particular requirements—cast, combination, forged and fabricated steel, roller or silent. So, whatever your chain problems, large or small, Link-Belt engineers will work with you or your consultants to help solve them.

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CHAINS AND SPROCKETS

DuPont Petroleum Research

reports new findings on the basic precombustion reactions underlying the occurrence of knock

HIGH compression engines are increasing the need for fuels having greater knock resistance. And since production of such fuels is becoming more costly, a better understanding of the knock process and discovery of improved means for its control are of considerable importance.

With the future needs of the petroleum industry in mind, the Du Pont Petroleum Laboratory is intensively studying the basic chemical reactions which lead to knock. From this program it is believed that information will be obtained which will help in designing new improved fuels and lead to the more efficient utilization of present fuels.

The tendency of a fuel-air mixture to knock is determined by the extent and type of precombustion reactions occurring in the unburned charge ahead of the flame front. And the build-up of knock-producing materials depends to a considerable extent on the chemical composition of the fuel, but is influenced by the ratio of hydrocarbon to oxygen and the time allowed for the reactions to take place.

MOTORED ENGINE USED IN STUDIES

In the studies, the effects of changes in fuel-air ratio and engine speed on the complex precombustion reactions of several different types of hydrocarbons were examined so as to gain a clearer insight into the nature of these reactions.

Precombustion reactions were initiated by compressing the fuel-air mixtures in a motored engine. The physical conditions under which they occurred were determined. Since this technique substitutes compression of the unburned charge by the piston for compression of the end gas by the flame front, the problem of isolating the proknock reactions is simplified greatly. The engine was equipped with a quartz window and a photoelectric tube in order to detect the faint radiation which signals the presence of a cool flame. The radiation detected by this tube was amplified 40 million times and the resultant output applied to an oscilloscope screen.

OXIDATION A TWO-STAGE PROCESS

Most hydrocarbons oxidize by a two-stage process. The first consists of the early hydrocarbon oxidation reactions which lead to the formation of a cool flame. The second stage is accompanied by a cool flame and persists in a motored engine until autoignition of the charge takes place. In general, changes in the mixture ratio entering the engine were found to affect both the first and second stages of the fuel oxidation process.

An increase in the fuel-air ratio inhibits the early hydrocarbon oxidation reactions, requiring higher temperatures and pressures for the initiation of cool flames. The autoignition tendencies of the hydrocarbons usually are suppressed by increases in fuel-air ratio, although a minimum in the conditions required for autoignition often is evident close to the stoichiometric fuel-air ratio. These effects on autoignition are very similar to the effects of fuel-air ratio on the trace knock limits of fuels in fired engines.

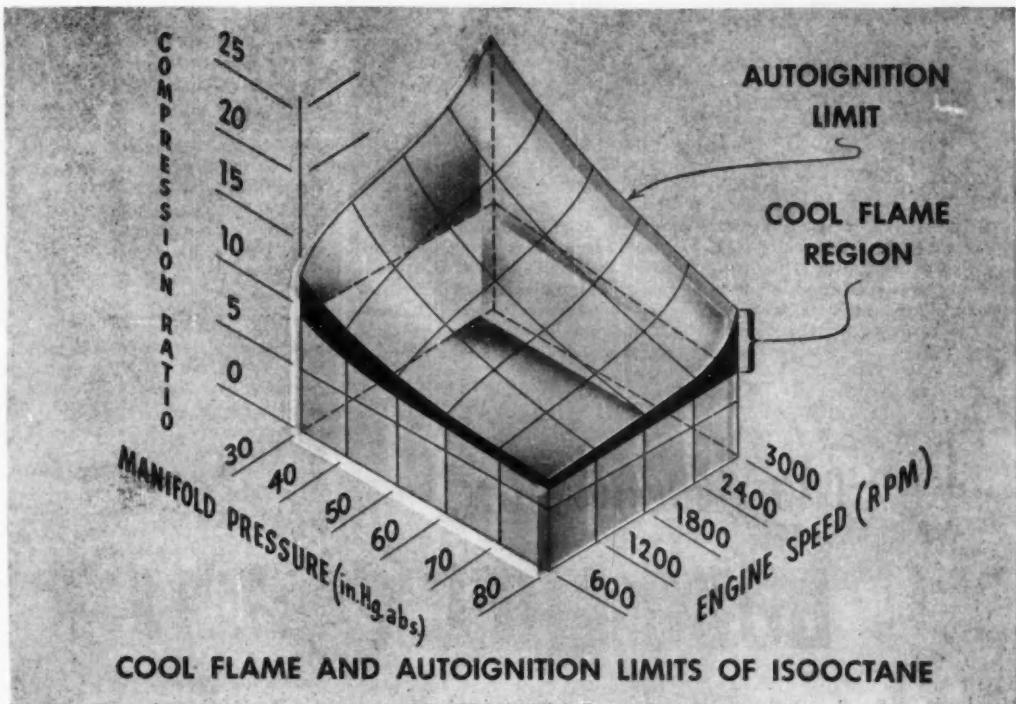
NATURE OF THE CHEMICAL REACTION

Information as to the nature of the chemical reactions involved in both stages of the precombustion reaction process was obtained by a study of the effect on these reactions of two different types of chain reaction inhibitors—nitrogen and tetraethyl lead. Nitrogen was found to retard principally the first stage of the reaction, while tetraethyl lead was effective largely in slowing the cool flame reaction. This behavior indicates important differences in the two reaction phases leading to knock.

NATURE OF THE PHYSICAL REACTION

From a physical standpoint knock results when the end gas in an engine cylinder is stressed to a critical temperature and pressure for a sufficient time. The effect of this time factor has been investigated by determining the cool flame and autoignition limits

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of hydrocarbons at different engine speeds. The lower cool flame limit did not appear to be affected by engine speed. But the conditions required for autoignition became more severe as engine speed was increased.

The information obtained in this study clearly shows the effects of the three fundamental variables controlling knock—pressure, temperature, and time—on the ignition behavior of a hydrocarbon. The effects of these variables when isoctane is used as the fuel are shown in the chart above.

TEMPERATURE SENSITIVITY OF HYDROCARBONS

A study of the effects of pressure and temperature on their autoignition limits has provided a measure of the absolute temperature sensitivity of hydrocarbons. Many hydrocarbons were found to change markedly in temperature sensitivity as engine conditions were changed; even heptane, which is assigned a sensitivity of zero, is quite temperature

sensitive under some conditions. The difference in temperature sensitivity of two hydrocarbons, as measured by the standard rating procedure, was explained by a method in which end gas temperature-pressure paths for fired engine cycles under Motor and Research Method rating conditions were superimposed on the autoignition limits of the hydrocarbons at 600 and 900 rpm.

This work on precombustion reactions is part of a continuing research program at the DuPont Petroleum Laboratory. Since DuPont is a major supplier of tetraethyl lead and other gasoline additives, the aim of this program is to help refiners improve fuel performance through the use of additives.



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News of the MACHINERY INDUSTRIES

(Continued from page 108)

partment. With the Anacom, all components and factors, whether electrical or mechanical, are reduced to simplified electrical analogs. To construct the analog for the entire regulator system, the analogs of the various components are assembled. With the analog, different operating conditions can easily be simulated on the Anacom.

Mr. R. A. Ramey of the Westinghouse Magnetic Development Section discussed the influence of materials on magnetic amplifiers. In order to provide improved magnetic materials for magnetic amplifiers, Westinghouse found that optimum characteristics could be attained by use of electrolytically pure iron and hydrogen annealed nickel. To make the material

suitable for use, it has to be coated with magnesium oxide powder between successive convolutions and then annealed for several hours in a special furnace. The annealing temperature, approximately 1100 F, is held to plus or minus 10 F. In describing the rectifiers utilized for the magnetic amplifiers, Mr. Ramey stated that Westinghouse is producing selenium types which have a performance beyond an original goal of 1000 to 1.

Wind Tunnel Motor

Another interesting piece of information obtained at Westinghouse concerns the construction of an 83,000 hp a-c motor which is being built for a supersonic wind tunnel. According to current plans the 225 ton motor will be delivered sometime in 1954.

Gear Index

The AGMA index of gear volume for October (based on the new index of 1947-49 = 100), is stated at 160.8. This is a 12.1 per cent increase as compared with September.

Machine Tool Appropriations

We have received a report on a special fund for machine tools, which Congress will be asked to appropriate, from A. K. Rannels of AUTOMOTIVE INDUSTRIES' Washington office. The report follows:

Congress will be asked to appropriate a special fund to finance production of selected heavy, long lead time machine tools and other special purpose capital equipment for stockpiling against need for all-out mobilization or war.

No specific amount has yet been decided upon. But mobilization officials are talking in terms of "less than \$1 billion" as a "substantial down payment" to get the program going.

The funds would be placed in a special account which could be tapped only by the Secretary of Defense. They could be used only to produce machine tools which require a long lead time but which are needed in a hurry in the event of an emergency.

This decision has been made on the basis that the mobilization job to date has been to get capacity and production necessary to support a defense program at present levels.

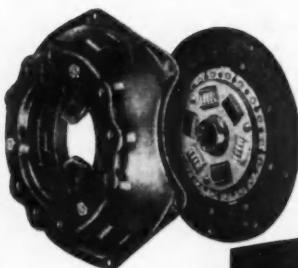
This means the necessary volume "to adequately equip and maintain the presently planned limited military forces, also reserve supplies for

(Turn to page 120, please)

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AIRBRIEFS

(Continued from page 72)

Army Wings Grow

While Air Force Undersecretary Roswell L. Gilpatric was bemoaning the existence of four different Air Forces in the U. S. (USAF, Army, Navy and Marine Corps) one of them, the U. S. Army, was quietly increasing its hold. A "memorandum of understanding" between the Army and the USAF was agreed to in which the Army is now entitled to purchase aircraft with an empty weight of 5000 lb. Previously the Air Force permitted the Army to buy airplanes weighing no more than 2500 lb empty without its approval. Such an agreement is necessary due to the fact that the Air Force, previously, carried full responsibility for the design, procurement and inspection of all Army aircraft. The U. S. Army now operates the Cessna L-19A Birdog, the de Havilland (Canada) L-20A Beaver, and the Beech L-23 Twin Bonanza as lightweight liaison aircraft. These aircraft are now selected, purchased, operated and maintained entirely by the Army Ground Forces. Significantly, the new agreement specifically excludes helicopters, leaving the way clear for the Army to purchase some of the larger types, such as the forthcoming Piasecki XH-16, which has a cabin as big as a Convair Liner transport. It is already obtaining the big Sikorsky H-19, 10-passenger rescue helicopter.

Airline Readiness

The Air Force and the Defense Air Transportation Administration have no intention of permitting a repetition of World War II experience when the (then) Army Air Corps was forced to virtually commandeer the bulk of U. S. airline transports. A joint policy has been worked out between USAF and DATA under which all suitable transports in the U. S. will incorporate such modifications as are necessary to permit their rapid conversion to military transport planes. This work will be paid for by the Air Force and will include not only transports already in service but those now under construction for future delivery. The modifications vary widely between transport types but, generally, consist of making the seats easily removable, installation of provisions for litter racks, additional fuel tanks and myriad other changes. Mobilization plans have

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By using Shelby Seamless Mechanical Tubing you can eliminate or greatly reduce many time and labor consuming operations connected with boring and machining.

Shelby Seamless Tubing is available in a complete range of sizes; in different wall thicknesses; various finishes and steel analyses . . . with the basic shape already made . . . and with the hole built in.

Another important advantage in using Shelby Tubing is that its excellent machining characteristics and uniformity speed up production and improve the quality of your output. You can turn out parts by the millions and the last part will be as metallurgically and dimensionally accurate as the first.

Why not talk to National's engineers about the economic advantages of using Shelby Seamless Tubing? You can be sure that any recommendations they make will be based on a thorough study of your particular requirements.

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been prepared and agreed to by the present owners for the rapid transfer of airline transports to the Air Force in the event of an emergency.

Aircraft Labor

Labor turnover in the aircraft manufacturing industry, despite higher wages and generally better working conditions, is higher than the average for all manufacturing industry: 5.1 per cent as compared with 4.9 per cent. Of the 5.1 per cent, 4.3 per cent quit, 0.4 per cent are fired, 0.3 per cent are separated for various

reasons including entry in the Armed Forces and 0.1 per cent are laid off. The quit rate is highest (4.8 per cent) in the airframe industry and lowest in the propeller business. Highest rate of discharge (0.6 per cent) is in the aircraft engine industry, the highest precision phase of the aviation industry.

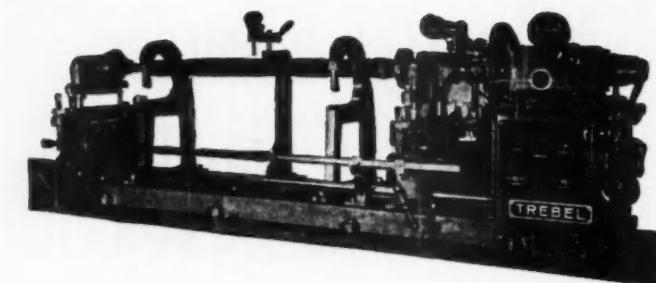
Electronic Hotcakes

The volcanic growth of electronic equipment in aircraft, its enormously rapid increase in complexity, and the very high skill needed for its

manufacture has prompted the General Electric Co., under Signal Corps contract, to develop a fully-automatic "factory" for the production of printed circuits. In a continuous operation, a machine now being developed, will be able to stamp, solder, inspect and package complete electronic units. The particular style of circuit is controlled by punch-cards and the circuit can be changed by introducing a new set of cards when desired. Not only will the 24-hour "factory" operation greatly increase production but quality is expected to be greatly improved. The necessity for such a machine will grow rapidly as guided missiles get into expanded production. Since each flight of a missile is its first and last, the necessity for economical yet reliable electronic components in vast quantities is apparent.

BOOKS ...

WEIGHT-STRENGTH ANALYSIS OF AIRCRAFT STRUCTURES, by F. R. Shanley, published by McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. Price, \$8.50. A Rand Corp. research study, this 400-page book fills the need for scientifically sound methods of analyzing and predicting the structural weight of aircraft and missiles. Part I describes methods by which the minimum weight can be determined for any material and conditions of loading. These principles of design for minimum weight are then employed to derive weight equations for wing and fuselage structures, the subject matter of Part II. Part III includes a number of reports prepared in the course of investigations of new materials and extreme operating conditions. Since a new approach to the subject has been made through use of the principles of optimum structural design, or design for minimum structural weight, structural weight equations may be derived in a sound scientific basis. Weight equations may be used to determine the overall efficiency of the structure and to predict the effects of major changes in design, materials of construction, load factors, etc. Many departures in presentation and treatment of materials have been made. One of these involves the use of "integration factors" which permit integration processes to be treated separately. Another new feature is the employment of the "structural index" as a basis for determining the allowable stresses of structures which fall through instability. The designer or stress analyst will find answers in this book to many difficult problems that arise in the course of his work.



Balancing this 60" propeller shaft is no trouble with a TREBEL

THE propeller shaft is first dynamically balanced by spot welding two compensating weights onto the shaft ends near the universal joints. The exact size and location of these weights is indicated by the machine. Shaft is then accelerated to its critical speed and amount of deflection read off a dial. A third weight is welded on in the middle of the shaft opposite the point of maximum deflection to insure a smooth running condition at all speeds.

A variable high speed control, free wheeling, safety latches and tachometer are provided for the spin test.

Shafts up to 96" long, weighing from 20-130 pounds are accurately

and quickly balanced in the TREBEL 60" DYNAMIC balancing machine—also crankshafts, flywheels, electric armatures, etc. with a range of 20-260 pounds. Guaranteed accuracy is 1 ounce-inches or .000002 inches displacement of center of gravity.

Unique Balancing Principle using a counter force to compensate for unbalance eliminates complicated set-ups and makes possible the indication in simple, easy-to-read units such as length of wedges in inches, or depth of a standard diameter hole, etc. Delivery is prompt. May we send you full details?

See the TREBEL in operation in New York, Detroit or our Cleveland Service Center.

YOUR AUTOMOBILE—HOW TO UNDERSTAND IT, published by Secony-Vacuum Oil Co., 26 Broadway, New York, N. Y. Price, \$1.00. Written to explain the intricate mechanism of today's automobile, this booklet is based on the premise that safety and economy of operation depend to a great extent on proper understanding and maintenance. A complete analysis of all mechanical parts and their functions is given, and the importance of proper lubrication is highlighted. This profusely illustrated manual is not, however, a handbook for the correction of operating troubles.

KURT ORBAN
COMPANY, INC.
219 East 42nd St., New York 17 • 4220 Prospect Ave., Cleveland 3 • 19480 James Couzens Highway, Detroit 26
Canadian sales by European Machinery Ltd., 11 King St. West, Toronto, Canada

"These models weren't born yesterday"

Although today's new model cars may be fresh from the assembly line, each has been a long time in the making! Preceding every one are months, even years of design and testing... of continuous search for improvements in car performance and dependability.

Especially is this true of the castings which are the very heart of each new model. Castings today are better... in strength, in resistance to wear and in machinability.

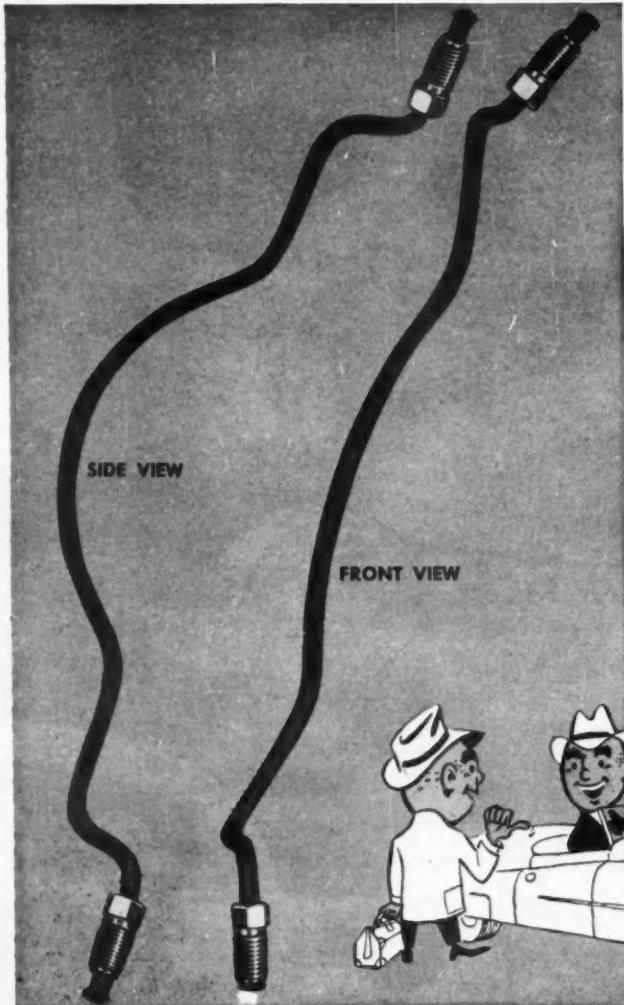
Automotive engineers have long looked to Campbell, Wyant and Cannon for the new and better in castings... for improvements which have paced other important automotive developments. Advanced metallurgical engineering, precision control and mechanized production, pioneered and perfected by this largest independent foundry, make possible such improvements in castings... make them available today for tomorrow's new models.

CAMPBELL, WYANT AND CANNON FOUNDRY COMPANY, MUSKEGON, MICHIGAN
Foundries in Muskegon, South Haven and Lansing, Michigan

...serving the automotive, farm equipment, railroad and marine industries and the Armed Forces.

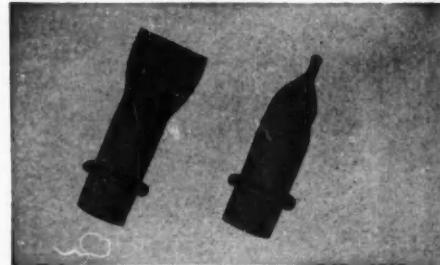


Get the most from your



1. FABRICATION SAVINGS

Bundy engineers help pare fabrication costs. An example is the automotive brake tube shown at left. The proximity of the small-radius bends to one another made bending the tube without distortion difficult. Yet Bundy engineers went to work, came up with a *single* fixture to do the complete job without distortion. The result: total fabricating time reduced, costs lowered. These engineering skills are always at your disposal when you specify **Bundyweld**.



2. COST SAVINGS

Though it's less than $1\frac{1}{4}$ " long, the timing-gear oiler tube shown above calls for three fabrication steps: piercing, flattening and upsetting. Bundy engineers were able to combine all steps into a single press operation. More, in that single operation two parts are produced simultaneously. The result is an impressively low cost-per-unit on a high-volume order. More, savings like this are passed right along to you as a Bundy customer.



WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of copper-coated steel. Then it's . . .



continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Copper coating fuses with steel. Presto . . .



Bundyweld, double-walled and brazed through 360° of wall contact.

Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.; Austin-Hastings Co., Inc., 226 Binney St., Bank Bldg. • Chicago 32, Ill.; Lophon-Hickey Co., 3333 W. 47th Place • Elizabeth, New Jersey
 Rutan & Co., 1717 Sansom St. • San Francisco 10, Calif.; Pacific Metal Co., Ltd., 3100 19th St., San Francisco 10, Calif. • Toronto 5, Ontario, Canada; Alloy Metal Sales, Ltd., 181 Fleet St., East • Bundyweld nickel and Monel

San Francisco, 10, Calif. Pacific Metals Co., Ltd., 3100 19th St. • Seattle 4, Wash.: Eagle Metals Co., 4755 First Ave. South •
Rutan & Co., 1717 Sansom St. • Toronto 5, Ontario: Canadac Alloy Metal Sales, Ltd., 181 Fleet St. East • Bundyweld nickel and Monotubing is sold by distribution of nickel and nickel alloys in principal cities.

AUTOMOTIVE INDUSTRIES, December 15, 1952

automotive tubing dollar

Safe, dependable performance, unequaled tubing features, and priceless engineering skills—yours when you specify Bundyweld Tubing.

You get safe, dependable tubing performance, proved by the 360,000 miles of Bundyweld used in cars, trucks, buses and tractors since 1930.

You get leakproof, lighter, stronger tubing that withstands severe shocks and has high fatigue limit. Bundyweld is the only tubing double-walled from a single strip, copper-brazed through 360° of wall contact.

You tap priceless engineering skills. Bundy engineers can often spot major savings in material and production costs during your design and planning stages. And, if you wish, Bundy will fabricate tubing parts for you—deliver them as specified exactly when you want them.

For your greatest automotive tubing buy on every count, specify Bundyweld.

Contact a Bundyweld Distributor (listed lower left), or write Bundy Tubing Company, Detroit 14, Michigan

Bundyweld Tubing

DOUBLE-WALLED FROM A SINGLE STRIP



3. PRODUCTION SAVINGS

No matter how tricky your tubing part, Bundy skills can help iron out production kinks. Distances A and B and Diameter X in the automatic transmission part shown above each had to be held to extremely close tolerances for perfect function. Bundy engineers quickly devised a method of producing the part so precisely in just two operations that trimming Length A to size was eliminated. The result: fewer operations, greater production efficiency—with no delay in initial production setup. Bundy skills can help you produce your tubing requirements faster and better.

New Flexible Sealing... T-J AIR CYLINDER

Designed with revolutionary application of
Super-Cushion

It's sealed with pressure—a revolutionary T-J application of flexible sealing that insures positive cushion action combined with automatic valving action for fast return stroke... eliminates binding and sticking... operates with low friction, minimum wear, and added power due to higher efficiency.



1. Metallic rod scraper to protect rod bearing and packing from dirt and grit.
2. Wrench flats.
3. Self-adjusting chevron type packing.
4. Permanent type adaptor ring.
5. Hi-tensile tie rods.
6. Heavy duty, hard chrome plated rod.
7. Generous fillet reduces stress concentration.
8. "O" ring static seal.
9. T-J new flexible cushion seal insures positive cushion with automatic valve action for fast return stroke. (Patent applied for)
10. Fine cushion adjustment.
11. Heavy wall precision honed hard chrome plate.
12. Controlled packing compression with metal to metal contact.

36 YEARS' EXPERIENCE **T-J**

TOMKINS-JOHNSON

PIVOTORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLIMCHORS

MACHINERY INDUSTRIES

(Continued from page 112)

a year ahead, and to carry out foreign and commitments."

Mobilization Director Henry H. Fowler believes this is in sight. Some 175-odd capacity goals for a variety of industries and materials have been established. Most of them are well on the way to completion. When completed, ODM thinking is that they will adequately support present mobilization levels and current economy.

But looking ahead, Fowler says, there is no leeway if there is a sudden crisis, such as need for all-out mobilization. Under this thinking, there are only two courses open.

One is to let matters ride until an emergency or all-out mobilization need develops. This would obviously mean a delay of up to two years or so in getting into production.

The other is to add new capacity for planes, armament and so on now by making special-purpose machine tools and heavy equipment for stockpiling against time of need.

First reports being received in Washington last week indicated that the immediate reaction of the machine tool industry was not a happy one. The chief objection seemed to stem from a fear (a) that the Government was either planning to build Government plants or (b) that it might eventually throw the stockpiled tools back on the open market on a bargain basement basis.

Fowler says there is no intention on the part of the Government to build any plants in connection with the program nor to produce any tools itself.

Insofar as the tools being tossed back on the market at cut prices is concerned, the stockpiled items would be of no use to anyone except for scrapping. They would be special purpose tools for making armament.

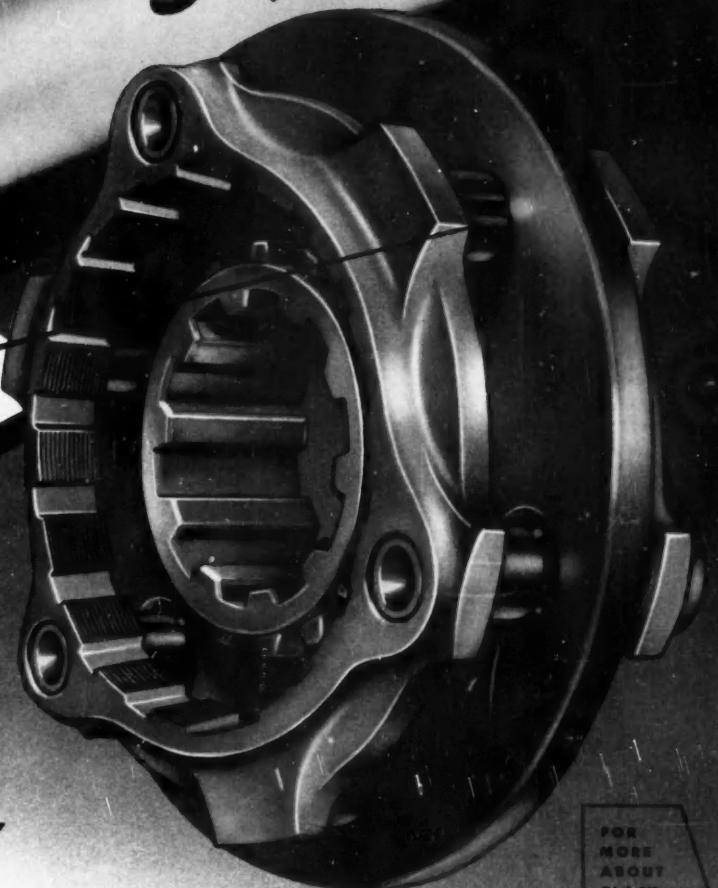
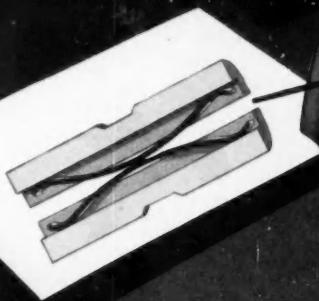
The program as announced by ODM conforms to recommendations made in the interim report of the Advisory Committee on Production Equipment, headed by Harold S. Vance, president of Studebaker Corp. It was released last week.

The committee says bluntly that not enough is now known about all-out mobilization needs to justify any attempt to produce and stockpile end items on a wholesale basis. But, it goes on to say, there is no reason why production should not go ahead on

(Turn to page 126, please)

CLARK

THE Split-Pin Synchronizer



featuring
SIMPLICITY
RUGGEDNESS
DEPENDABILITY

CLARK EQUIPMENT COMPANY

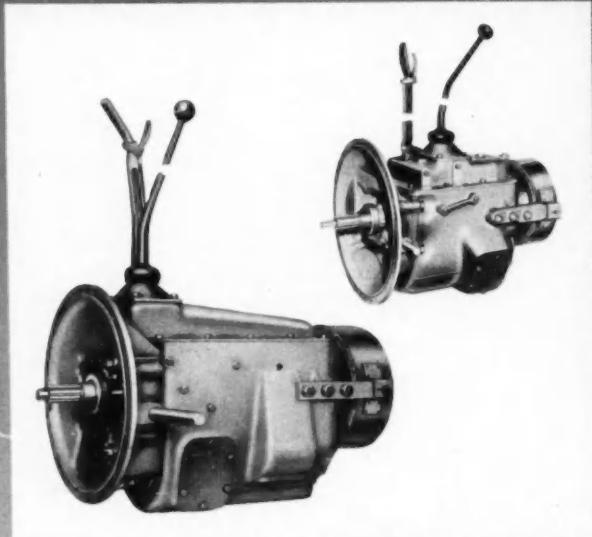
BUCHANAN, MICHIGAN • Other Plants • BATTLE CREEK • JACKSON, MICHIGAN

FOR
MORE
ABOUT
CLARK
EQUIPMENT
TURN
THE
PAGE

CLARK

transmissions

Applying imaginative enthusiasm for engineering development to the practical solution of production needs is as typical of Clark Equipment as the trade mark. This combination of vision and practicality will continue to produce a full range of conventional transmissions. It will also continue to produce transmissions for specialized, unusual requirements . . . for trucks, buses, farm tractors, industrial trucks and road building machines.



Products of Clark - TRANSMISSIONS



AXLE HOUSINGS

FORK TRUCKS & TOWING TRACTORS



GEARS & FORGINGS



FRONT & REAR AXLES FOR TRUCKS & BUSES



TRACTOR UNITS



MAGNESIUM ASSOCIATION

(Continued from page 108)

Service Experience with Magnesium in the Commercial Highway Transportation Industry

By G. K. Glaza and R. E. Perry, The Dow Chemical Co.

If we acknowledge that the future welfare of the magnesium industry depends heavily on the development of large commercial markets, and begin to search around, logic leads us directly to the commercial highway transportation industry as being among the largest, if not the very largest, potential commercial market for a premium-priced, lightweight, structural material.

The annual production of trailer, truck, and bus bodies, if all were made of magnesium, would require approximately 90 million lb of extrusions, 40 million lb of sheet and plate, 25 million lb of castings.

Certain design and fabrication problems, extreme corrosive conditions and other considerations would certainly prohibit or limit the use of magnesium in a large number of these units.

The premium that would be paid for light weight in the huge portion of this market that is adaptable to magnesium, of course, varies considerably. Reliable reports indicate weight saving to be worth \$1.00 per lb per year in many types of operations.

The willingness of operators to pay a premium of 50 cents to 90 cents per lb of weight saved has been demonstrated many times. Unquestionably the economies in a large number of cases are generous enough to include magnesium.

Elimination of that portion of the market that for technical or economic reasons is deemed unsuitable for magnesium construction still leaves an extremely large and, therefore, attractive market for magnesium in our commercial highway transportation industry.

The Magnesium Department of the Dow Chemical Co. has concentrated its main efforts on wrought products; and because manufacturing facilities that have been available over the past few years have enabled magnesium extrusions to enjoy a more favorable competitive situation than magnesium sheet, the major portion of our effort on wrought products has been expended developing new uses for magnesium extrusions.

Magnesium in contact with dissimilar metals provides a potential source of galvanic corrosion unless ade-

quately protected. Conditions required for such corrosion are: electrical contact between the two metals and an electrolyte mutually in contact with both metals. The electro-

lyte may be in the form of trapped road splash, moisture in dirt or mud, trapped condensate, or moisture held in corrosion product or insulating material. Obviously, potential galvanic couples will be present because of the necessity of using aluminum rivets, steel bolts, hinges and other hardware, and joining the body to a steel framework. It should be recognized that steel-to-magnesium couples are capable of causing severe corrosion of the magnesium. The answer to this problem involves several steps. First it is necessary to insulate between the steel and magnesium con-

TEST CASTINGS



3 times faster with
VACUUM

THE FASTEST, CLEANEST, SAFEST TO TEST FOR LEAKS IN
CASTINGS, OIL PANS, HOUSINGS, MECHANICAL SEALS, ETC.

Vacuum testing is the fast, clean, safe method of testing water pumps, cylinder walls, mechanical seals, and similar parts. The *automatic Whittington Vacuum Tester leaves no margin for operator error . . . if a casting is good, a light glows green . . . if bad, a light glows red. The Whittington Tester is the simplest, most accurate

*Also available in semi-automatic and manual models.

SEND THIS COUPON Today!

WHITTINGTON

PUMP AND ENGINEERING CORP.
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Gentlemen: Please send full details
on the WHITTINGTON Vacuum Tester.

Name _____
Company _____
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Ancient Egyptian Engineers Developed the FIRST Conveyors

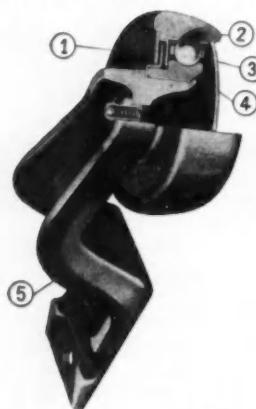
Reputedly, the Pharaohs' great engineers solved their problems for conveying huge stone blocks, used in construction of the Pyramids, by having thousands of slaves "trolley" these tremendous stones from the Nile over tallow-lubricated logs. Nowadays, materials handling is made more efficient, speedy and labor saving because —



JERVIS B. WEBB COMPANY

was the FIRST to develop
the Triple Labyrinth
SEALED TROLLEY
the Power behind
REGULAR TROLLEY and
POWER AND FREE CONVEYORS

The Webb "Red Seal" Trolley has been an outstanding success since its introduction. The fundamental design included flangeless hardened steel wheels, improved tread contour, retainer type ball bearings and hardened and ground races. It showed its superiority in varied services, in hundreds of installations. The present "Red Seal" design offers many improvements (listed here) — placing it far out in front.



The 4" No. 3377 Swaged Trolley shown has no bolts, pins or nuts, and like all Webb Trolleys is arranged for pressure gun lubrication.

1. TRIPLE LABYRINTH SEAL

Three walls of steel to keep the lubricant in and the dirt out.

2. HARDENED STEEL WHEELS

Contoured to fit the flange of the I-beam on which they ride.

3. LARGE ALLOY STEEL BALLS

Eight 15/32". Highest quality alloy steel balls operate in a deep groove retainer type bearing. Due to the lower friction with retainer type bearings, the life is longer.

4. PRECISION GROUND RACES

Large diameter ground to precision specifications — less friction.

5. STURDY DROP-FORGED BRACKET

The wheel is firmly swaged to the bracket, eliminating loose rivets or bolts, making the wheel and bracket an integral unit.

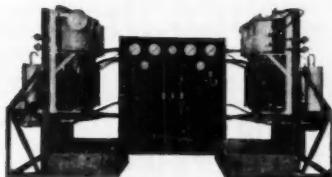


tacting surfaces. Caulking compounds, insulating tapes, or shims of zinc or 52S or 61S aluminum are suitable for this purpose. It is essential that the insulating interface be maintained in service, so the choice of material is based on the conditions encountered at the joint. An electrical circuit can still exist between the steel and magnesium through mutual contact to bolts, rivets, or other fastening fixtures. Consequently, it is specified that the insulating material overhang the bimetallic joint a minimum of one-quarter inch. The increased distance separating the two metals makes it more difficult for electrolyte to bridge the gap and hence minimizes the galvanic corrosion possibilities. The steel and magnesium adjacent to the contact area must be primed and painted. It should be emphasized that it is even more important to prime and paint the steel than the magnesium.

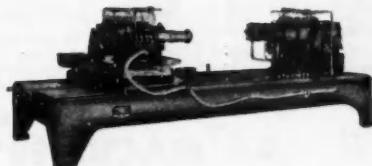
Now let us consider the problem created in joining magnesium and aluminum. Here we are fortunate that some of the aluminum alloys when coupled to magnesium do not create a serious galvanic corrosion problem under the conditions encountered in this application. These alloys are 52S, 56S, and 61S. Other commercial aluminum alloys can be used in contact with magnesium only by following the same precautions as for steel.

Recognizing the method to combat galvanic corrosion is only a small part of the job of eliminating this problem. The fabricator must be made to realize that if he simply orders high strength aluminum rivets, he will undoubtedly receive A17S alloy. It is essential that he knows he should order 56S rivets. It is necessary that he realizes the most effective way to make steel to magnesium couple ineffective is to inhibit the action of the steel. This can be accomplished by painting steel structural members and using only cadmium or zinc-plated bolts, nuts, screws, or other fasteners or hardware fixtures. He must realize that even when he pacifies the steel by one of these methods, it is necessary to use a shim or washer of 52S or 61S aluminum alloy between the steel and magnesium. To be effective, these shims or washers must overhang the joint by a minimum of one-quarter inch.

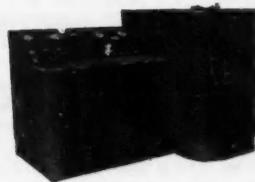
Trucking companies are particularly conscious of paint-adhesion problems because it is common to use expensive advertising art work incorporated with the paint job. Where this is a problem, it is frequently



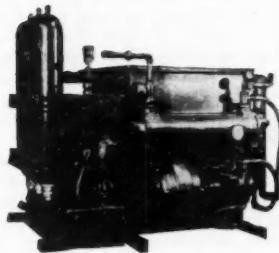
Universal Jet Fuel Nozzle Test Stand



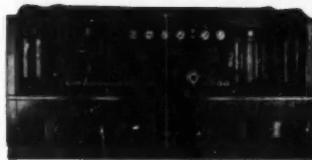
Universal Torsional Shaft Tester



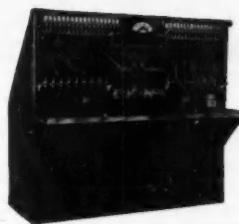
Universal Propeller Governor Tester



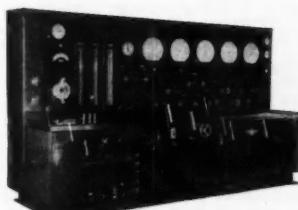
Rock Crusher Hydraulic Power Pack



Jet Engine Lube Pump Test Stand



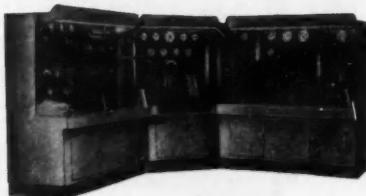
Universal Magneto Test Stand



Master Hydraulic Pump Accessory Test Stand



Portable Hydraulic Test Stand



Servicenter for Aircraft Accessories

"But who tests the test equipment?"

Greer engineers test it—many times over, under conditions far more severe than normal operation—before it ever leaves the plant. For we know that testing equipment must have the complete confidence of those who use it. Greer equipment deserves that confidence, and has it—because it has earned it.

Not mass produced by the multi-thousands, each Greer test stand is painstakingly engineered, and is carefully tested in each stage of production for absolute accuracy. The men who design them and the men who build them have many years of specialized experience in this narrow field. It is experience that is difficult to find—perhaps impossible to match elsewhere.

In addition to standard models, many special machines have been developed to meet specific requirements. A staff of creative engineers is always available for a discussion of out-of-ordinary problems. Write or call today; no obligation.



GREER HYDRAULICS INC. • 454 EIGHTEENTH STREET • BROOKLYN 15, NEW YORK

Field Offices: Greer Hydraulics, Inc., 298 Commercial Building, Dayton, Ohio • 2832 East Grand Boulevard, Detroit, Michigan
Representatives: Thomson Engineering Service, 708 Hemphill Street, Fort Worth 4, Texas • Harold E. Webb, 918 N. Kenilworth Avenue, Glendale 2, California

solved by the substitution of a newly developed type of primer based on polyvinylbutyl and other modifying resins.

Fretting problems have been encountered in one particular situation. It is customary to use a wooden filler strip between the frame and truck body. The problem is encountered at the magnesium, wood interface. Magnesium oxide and other foreign abrasive materials may imbed in the wood and cause excessive abrasion of the magnesium. The installation of a steel wear strip at these points has

eliminated the problem. It is necessary that the wood be sealed and painted and the magnesium primed and painted at these joints. This is

necessary to prevent the leaching out of the acids from the wood and resulting attack by these acids on the magnesium.

News of the MACHINERY INDUSTRIES

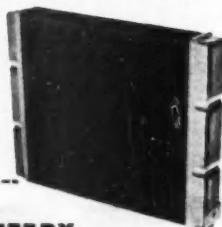
(Continued from page 120)

selected items of heavy, specialized production equipment to be held in reserve for use when and if needed.

EVANS BALANCED DESIGN and "Married" components deliver PLUS PERFORMANCE

HEAVY DUTY CORE

is built to take full advantage of the water temperature and volume available in each individual vehicle. Air passages are designed for minimum pressure drop.



LOW BATTERY DRAIN MOTOR

Specifically designed for each component—not too small, not too large . . . just right for highest efficiency.

LIGHTWEIGHT UNBREAKABLE FAN

with precision die molded airfoil section blades moves maximum air with least noise and power consumption. Sturdy one-piece construction; nothing to loosen or get out of balance.



EVANS CUSTOM ENGINEERING CAN HELP SOLVE YOUR PROBLEM

Evans is staffed to engineer promptly a heating and ventilating installation to your specifications, organized to build prototypes quickly, equipped to test them accurately to latest A.S.H.V.E. procedures. If you need high performance, ruggedly constructed equipment—custom built to your specifications—consult Evans Products Company, Heating & Ventilating Division, Dept. P-912, Plymouth, Michigan.



EVANS CUSTOM HEATING AND VENTILATING
FOR A WORKING WORLD ON WHEELS

It suggests that each military service be required to make a special analysis of its probable needs and to submit an estimate of requirements with respect to its longest lead time items. From these lists, ODM would select the equipment to be made and stockpiled.

The Vance committee interim suggestions and recommendations were seemingly made on the assumption that there would be a need for continuing defense preparations at a high rate for an indefinite period.

Even though the Government says it does not intend to build any plants in connection with the program, warehousing and storage facilities would have to be provided.

These would have to be at either existing defense plants or contracted for with commercial warehousemen. There are some who expect an eventual proposal that, since storage is necessary, why not build complete plants and install the equipment?

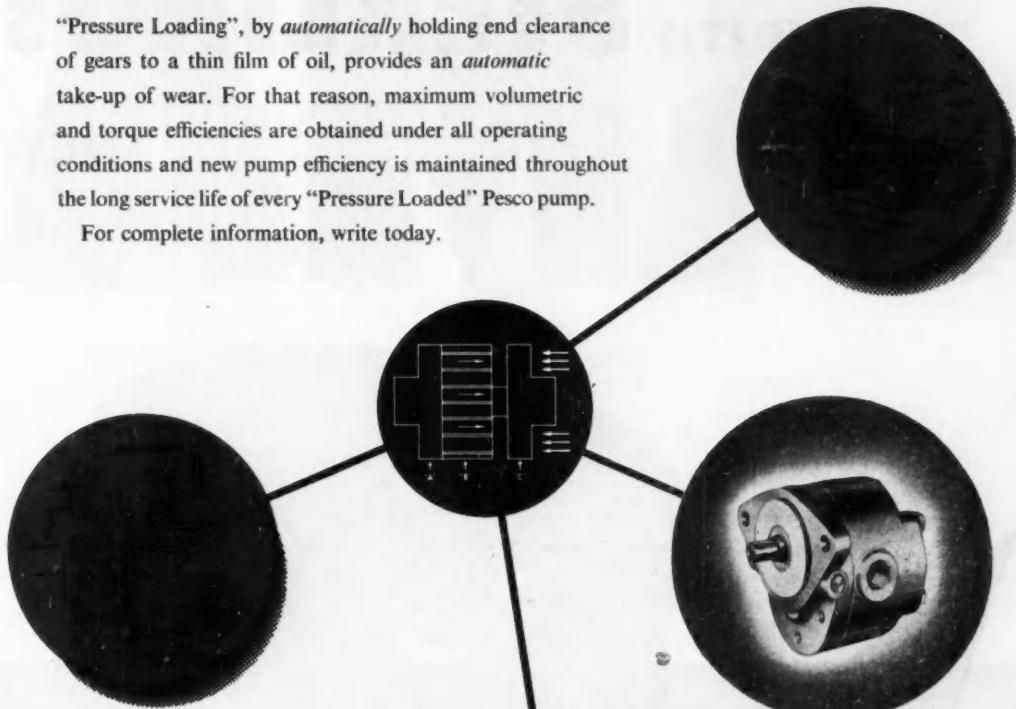
BOOKS . . .

ADHESIVES FOR WOOD, by R. A. G. Knight, published by Chemical Publishing Co., 212 Fifth Ave., New York, N. Y. Price, \$5.00. Intended to serve as a guide for the younger technician and to provide a ready reference for the experienced man, this book takes as its main theme one of the engineer's most familiar problems—how to join components together. The components in this case are, of course, wood in one of its many forms. In addition, the joining of wood to metals and plastics is also considered. Among the many topics covered are: plywood; veneering; durability of glues; vegetable-protein derivatives; phenol-formaldehyde, polyvinyl, and polyurethane adhesives; synthetic resin glue extenders; boats and aircraft; aging, soaking, and mycological tests; and cyclical tests of wetting and drying. The book contains many interesting diagrams and tables, giving numerical data on the moisture content of wood in various applications, the specifications for manufacturing procedures and final products made of wood, and the results of various tests. Other features are a glossary of special terms, a comprehensive index, and many references on every phase of the subject.

"PRESSURE LOADING" is the exclusive, patented principle of Pesco Hydraulic Pumps which results in: Volumetric efficiencies up to 97%...Torque efficiencies up to 90%

"Pressure Loading", by *automatically* holding end clearance of gears to a thin film of oil, provides an *automatic* take-up of wear. For that reason, maximum volumetric and torque efficiencies are obtained under all operating conditions and new pump efficiency is maintained throughout the long service life of every "Pressure Loaded" Pesco pump.

For complete information, write today.



Pesco Products Division, Borg-Warner Corporation 24700 North Miles Road, Bedford, Ohio



NOW YOU CAN

WEAR A
MAN'S
W

THIS STEEL
TENSION MEMBER

maintains fitting
clearance from
-20°F. to 200°F.



FIT PISTONS TO LESS CLEARANCE

ZINNING CONFORMATIC

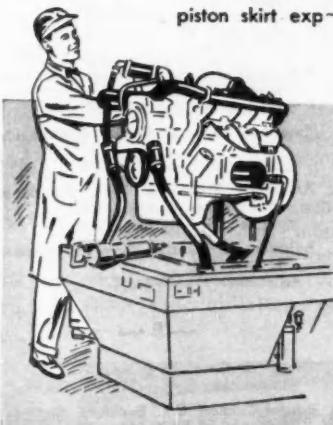
Without Danger of Scuffing
or Seizing...

"...quieter engines...no more cold slap...reduced friction...no loss of strength or conductivity..." No wonder Conformatic is the talk of the trade! This revolutionary new aluminum piston is made to be fitted at .001 clearance or less because an anchored steel

tension member actually makes the piston skirt expansion conform to

cylinder expansion. Long-range performance tests have shown this Conformatic control to be so accurate that pistons fitted at .001 have no cold slap at -20°F .—and no seizing or scuffing at 200°F .

Think of what this new piston idea can mean to you! For complete information and technical data, write or phone —



RESULTS OF 1200-HOUR CYCLE TEST

In recent cycle tests made by one of the largest automotive manufacturers, Sterling Conformatic Pistons were fitted into a stock engine at .0005 clearance. After operating the engine for 1200 hours, approximately 50% of which were run at 4000 r.p.m. or over, full load, full throttle, the Conformatic Pistons were pronounced perfect!

STERLING
PISTONS

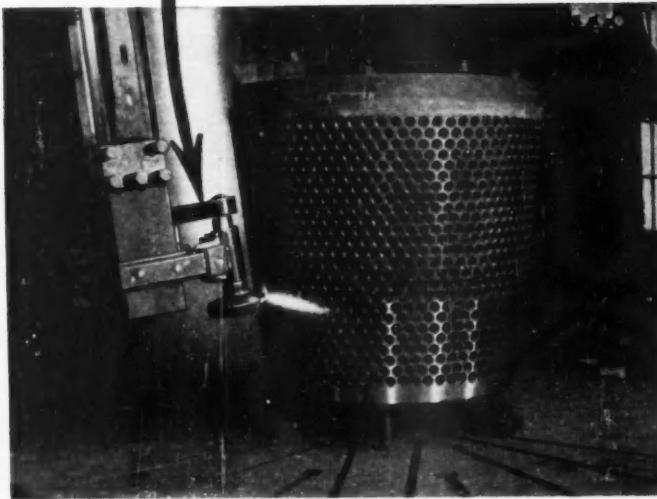
*T.M. Reg., Patent Applied for

STERLING ALUMINUM PRODUCTS INC.

St. Louis, Missouri



**DUMORE® tool post grinders
add productive capacity
to your present machine tools**



A Dumore tool post grinder provided the only solution for this unusual problem. Mounted on a vertical boring mill, it halved former production time for grinding on the perforated, tapered surface of 45° cast iron strainer cores.

PUT this Dumore grinder on a turret lathe, planer, milling machine, shaper, boring mill or universal grinder. In fact, mounted on any machine you'll get a more versatile tool that will not only machine the workpiece, but finish grind without changing setup — or switching job to another machine. What's more, it delivers precision work to .0001" accuracy.

Production men say the Dumore grinder is the busiest tool in the shop. They like its flexibility . . . the high

quality work it turns out. These grinders are ideal, too, for tool room and maintenance work.

Dumore tool post grinders often pay for themselves on the first job. They offer an amazing potential for reducing labor and handling costs . . . increasing machine capacity . . . improving product quality.

Ask your industrial distributor to show you how Dumore tool post grinders can cut costs for you, or write



THE DUMORE COMPANY
1339 Seventeenth Street • Racine, Wisconsin

**More
Defense Contract
Awards**

THIS latest list of defense prime contracts that have been awarded covers the period from October 17 to November 26. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

— A —

A. C. Spark Plug Div., Flint, Mich.
Vehicle parts—295,000—\$218,890

Adel Div., General Motors Corp., Burbank, Calif.

Pump, fuel—120 ea—\$37,909
Valve, hydraulic—70 ea—\$35,251
Valves—Various—\$167,468
Valve—60 ea—\$75,992
Hydraulic valve—80 ea—\$56,083

Aerial Machine & Tool Corp., Long Island City, N. Y.

Maintenance parts—Various—\$32,482
Bend assy—300,000 ea—\$37,800

Aero Supply Mig. Co., Inc., Corry, Pa.
Oil Selector Valve—30 ea—\$37,649

Air Associates, Inc., Teterboro, N. J.
Maintenance parts—Various—\$29,527

Air Associates, Inc., Teterboro, N. J.
Actuator—592 ea—\$292,180

Airesearch Mig. Co., The Garret Corp., Los Angeles, Calif.

Services and material—Various—\$100,000

Algonac Mig. Co., Algonac, Mich.
Vehicle parts—300—\$40,500

Allis-Chalmers Mig. Co., Milwaukee, Wis.

Right and Left Drive assembly—R 67—\$101,257
L 67—\$101,458

Allison Div., General Motors Corp., Indianapolis, Ind.

Bearing—1175 ea—\$65,521

American Bosch Corp., Springfield, Mass.

Starters—8697 ea—\$197,270

American Brakebloc Div., American Brake Shoe, Detroit, Mich.

Vehicle parts—12,000—\$30,861

Aviation Engineering Corp., Woodside, L. I., N. Y.

Indicator—91 ea—\$45,958

— B —

The B. G. Corp., New York, N. Y.
Ignitor plug assy—4732 ea—\$40,695

Barber-Colman Co., Rockford, Ill.
Thermostat—119 ea—\$32,939

Bearings Co. of America, Lancaster, Pa.
Hardware—26,900—\$30,397

Ben's Truck Parts, Tacoma, Wash.
Vehicle parts—50—\$35,000

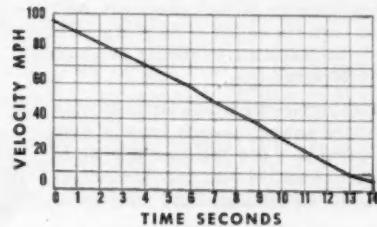


How to absorb 25 million FT-LBS of energy in 1000 feet!

This deceleration chart shows what happens when a pilot brings his 20 ton ship in for a landing. During this stop, terrific heats and pressures are created. Yet planes must stop safely... and quick!

American Brakebloc attacked this problem during World War II. Working closely with aviation brake manufacturers we developed the formulas to do the job. We helped solve some very difficult manufacturing problems, created mass-production methods and equipment.

Today we are a major supplier of aviation brake lining. Our research laboratories, manufacturing facilities and years of experience are ready to serve—either for military or civilian needs.



American
U.S. Pat. Off.
Brakebloc

THE SAFETY BRAKE LINING

Copyright 1952—American Brake Shoe Co.

Brake Shoe

AMERICAN BRAKEBLOK DIVISION
DETROIT 9, MICHIGAN

(Continued from page 130)

Bendix Products Div., Bendix Aviation Corp., S. Bend, Ind.

Poppet valve assy—1000 ea—\$96.884
Maintenance parts—Various—\$28.430
Spare parts—Various—\$119.835

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.

Aneroid shaft—1092 ea—\$46.158
Valve—4000 ea—\$196.238
Carburetor assy—67 ea—\$114.246
Nut used on injection & float type carburetors—2000 ea—\$40.417
Arm Assy—83 ea—\$38.092
Shock Strut—39 ea—\$51.568

Bertea Products, Pasadena, Calif.

Hydraulic Valve—560 ea—\$58.757

Bill Brown, Inc., Detroit, Mich.

Vehicle parts—120,000—\$70,800

Boeing Airplane Co., Seattle, Wash.

Kits—153 ea—\$232,651

— C —

Canfield Tool & Die Co., Detroit, Mich.

Vehicle parts—300—\$81,600

Caterpillar Tractor Co., Peoria, Ill.

Spare parts—Various—\$384,480

Chase Brass & Copper Co., Inc., Waterbury, Conn.

Hardware—72,662 lbs—\$27,617

The Cleveland Pneumatic Tool Co., Cleveland, Ohio

Maintenance parts—Various—\$61,428

The Cleveland Pneumatic Tool Co., Cleveland, Ohio

Maintenance parts—Various—\$61,428

The Cornelius Co., Minneapolis, Minn.

Compressors and regulators—Various
—\$1,011,597

Cupples Co., St. Louis, Mo.

Tires and Tubes—241,500—\$683,445

Curtiss-Wright Corp., Electronics Div., Carlstadt, N. J.

Trainer—48 ea—\$2,126,088

— D —

Dayton Rubber Co., Dayton, Ohio

Hardware—512,681—\$107,784

Detroit Aluminum & Brass Corp., Detroit, Mich.

Vehicle parts—4325—\$294,640

Douglas Aircraft Co., Inc., El Segundo Div., El Segundo, Calif.

Maintenance parts—Various—\$43,877

E. I. du Pont de Nemours & Co., Inc., New York, N. Y.

Plastic—transparent—2800 sht—\$101,703

— E —

Eastern Industries, Inc., New Haven, Conn.

Deicing pump—955 ea—\$126,632

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.

Regulators—46 ea—\$45,016

Regulators—Various—\$107,541

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.

Air pump—106 ea—\$88,796

Indicators & transmitters—176 ea—\$46,780

Eicor, Inc., Chicago, Ill.

Inverters—200 ea—\$334,854

Electrical Engineering & Mfg. Corp., Los Angeles, Calif.

Motor, cover assy—Various—\$34,368
clutch assy.

— F —

Fairchild Camera & Instrument Corp., Jamaica, N. Y.

Polarized relay—1791 ea—\$95,389

— G —

General Electric Co., Schenectady, N. Y.

Indicator—1514 ea—\$144,820

General Electronics Devices Corp., New York, N. Y.

Relay—6373 ea—\$27,312

The Goodyear Tire & Rubber Co., Akron, Ohio

Hardware—732,662—\$144,261

Grumman Aircraft Engineering Corp., Bethpage, Long Island, N. Y.

Maintenance parts—Various—\$36,659

— H —

Herach & Rademan, Inc., Phila., Pa.

Toggle switch—14,823 ea—\$26,250

Holley Carburetor Co., Detroit, Mich.

Spare parts—\$32,854

— I —

International Harvester Co., Chicago, Ill.

Truck, Cargo—1 ea—\$16,404

Truck, Cargo—1 ea—\$16,346



Successful operation in many thousand motor-driven products and devices—over a period of 36 years—has proved the thorough reliability of Lamb Electric Motors.

The good service for which Lamb Electric Motors are known, results largely from the fact that they are designed to provide the exact electrical and mechanical requirements for each product they drive.

This special engineering assures top product performance and usually results in savings in space, weight and cost factor. The Lamb Electric Company, Kent, Ohio.

THEY'RE GOING INTO AMERICA'S *Finest* PRODUCTS

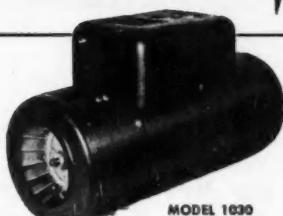


Planetary inbuilt speed reducer permits a straight-line drive, symmetrical construction; insures good performance.



ENGINE PRE-HEATING

*South Wind
brings you
all 3
in one heater!*



MODEL 1030

The most powerful heater for its size in the world with a usable output of 50,000 BTU's per hour! This truly compact unit, designed to meet military specifications, assures maximum vehicle and personnel efficiency under the most stringent weather conditions.

OVERALL PHYSICAL SIZE

| | |
|---|------------------|
| Weight (lbs.) | 23 |
| Height (inches) | 8 $\frac{1}{2}$ |
| Length (inches) | 16 $\frac{1}{2}$ |
| Width (inches) | 6 $\frac{1}{2}$ |
| Installation space (ft ²) | .523 |

WRITE TODAY for specific model information or experienced counsel on any phase of heating. Address inquiry to South Wind Division, Stewart-Warner Corporation, Indianapolis 7, Indiana.

► engine pre-heating

Floods engine components, battery, crankcase, carburetor with warm, heated air. Makes starting easier, faster — even at 65° below!

► personnel heating

Warm air — independent of engine heat, independent of engine operation — circulates swiftly, evenly, to keep personnel comfortable at all times.

► windshield defrosting

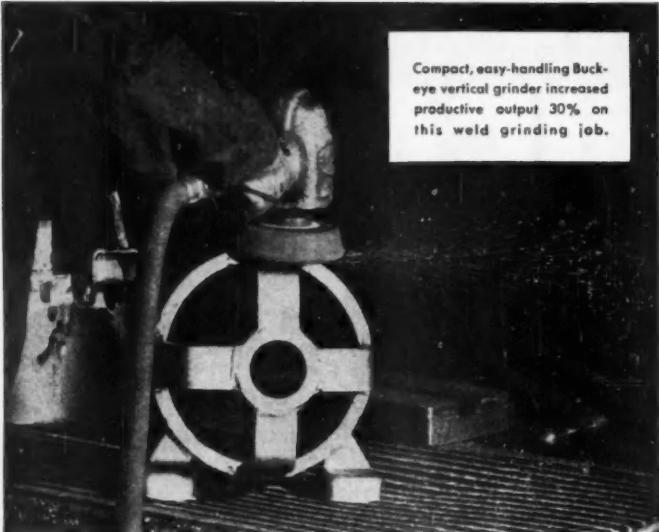
Keeps windshield reliably "frost-free." Assures clear vision, safer driving.

South Wind



A PRODUCT OF
PERSONNEL HEATING
ENGINE AND
EQUIPMENT PRE-HEATING
WINDSHIELD DEFROSTING

► increases output 30% on grinding operations



Compact, easy-handling Buckeye vertical grinder increased productive output 30% on this weld grinding job.

In a routine check of production operations, a welding equipment manufacturer discovered a grinder operating well below the RPM recommended for the work being done.

Replacing this tool with a Buckeye 6,000 RPM vertical grinder resulted in an immediate increase of 30% in productive output on this grinding job. In addition, the lighter, more powerful Buckeye grinder helped improve product quality, reduce tool maintenance costs, employee fatigue.

All of which proves it's very important to select the right tool for the job—and very expensive to go on using older, less efficient tools.

► what are you waiting for?

The right tool for your job may well be described in the Buckeye air or electric tools catalogs. We'd like to send you either—or both—with-out obligation, of course.

Buckeye Tools
CORPORATION
DIVISION 21 • DAYTON 1, OHIO

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

Portable Air
and Electric Tools
for Industry

(Continued from page 132)

—J—

Jack & Heintz, Inc., Cleveland, Ohio
Control box—50 ea—\$77,985
Terminal Block Assy.—Various—\$31,-
927
Starters—283 ea—\$124,907

—K—

Kohler Aircraft Products Co., Inc., Dayton, Ohio
Valve assy—Various—\$38,941

—L—

L & S. Bearing Co., Oklahoma City, Oklahoma
Hardware—47100—\$73,066

Lear, Inc., Grand Rapids, Mich.
Power unit—Various—\$80,453
Actuators—Various—\$227,016

Lear, Inc., Grand Rapids, Mich.
Actuators—193 ea—\$43,696

The Lecce-Neville Co., Cleveland, Ohio
Services—Various—\$35,000

Lipe-Railway Corp., Syracuse, N. Y.
Vehicle parts—485—\$79,947

Lord Mfg. Co., Erie, Pa.
Maintenance parts—Various—\$29,600

—M—

Marlin-Rockwell Corp., Jamestown, N. Y.
Bearings—1200 set—\$52,440

The Glenn L. Martin Co., Baltimore, Md.
Maintenance parts—Various—\$42,821
Parts—Various—\$59,890

The Glenn L. Martin Co., Baltimore, Md.
Slat Assy.—Various—\$54,778

Michigan Bolt & Nut Co., Inc., Detroit, Mich.
Hardware—2765—\$24,697

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Compensators—Various—\$44,867

Mohawk Rubber Co., Akron, Ohio
Tires and tubes—19,780—\$289,782

—N—

National Motor Bearing Co., Inc., Redwood City, Calif.
Vehicle parts—40,000—\$32,680

Northrop Aircraft, Inc., Hawthorne, Calif.
Airplanes—172 ea—\$142,913,250

—O—

Overhead Conveyor Co., Detroit, Mich.
Kit, assembly—550—\$28,875

—P—

Pacific Div., Bendix Aviation Corp., N. Hollywood, Calif.
Actuator—213 ea—\$42,973

Parker Aircraft Corp., Los Angeles, Calif.
Hydraulic valve—240 ea—\$80,385

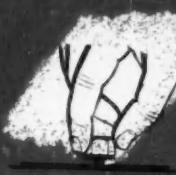
The Parker Appliance Co., Cleveland, Ohio
Spare parts—Various—\$135,750

Pence Products Div., Borg-Warner Corp., Bedford, Ohio
Pump assy—165 ea—\$42,834

A NEW
OPPORTUNITY
TO REDUCE
ASSEMBLY COSTS!

KEPS

...THE PRE-ASSEMBLED NUT AND SHAKEPROOF[®] LOCK WASHER



SAVE TIME

Only one nut to handle
...free spinning action
ensures fast, easy driving!



SAVE PARTS

The lock washer can't
drop off...every nut
is locked tight!



SAVE PAPER WORK

One order does the work of
two...nut and lock washer
inventories always balanced!

Send for this
Free Sample Kit!



for Better Fastenings and Lower Assembly Costs Come to
SHAKEPROOF

"Fastening Headquarters"

DIVISION OF ILLINOIS TOOL WORKS

St. Charles Road, Elgin, Illinois

Offices in principle cities

In Canada: Canada Illinois Tool Limited, Toronto, Ontario



TRY KEPS YOURSELF!

...see how easy they are to handle and
drive. See how much you can save!

(Continued from page 134)

Pesco Products Div., Borg Warner Corp., Bedford, Ohio
Hydraulic pump—345 ea—\$220,446
Philco Corp., Phila., Pa.
Modification kits—34 ea—\$42,832

— R —

Republic Aviation Corp., Farmingdale, L. I., N. Y.
Airplanes—80—\$5,500,000
Rohm & Haas Co., Phila., Pa.
Plastic, acrylic—Various—\$105,847

— S —

Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N. Y.
Harness assy—76 ea—\$140,305

Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N. Y.
Parts—Various—\$1,141,574
Stewart-Warner Corp., Indianapolis, Ind.
Spare parts for personnel—Various—\$103,479
heater kits
Stewart-Warner Corp., South Wind Div., Indianapolis, Ind.
Heater equipment—Various—\$34,882
Heater assemblies—Various—\$66,171
Thermo switch assy—Various—\$149,539
Ignition assy, heater
Heat exchanger 286 ea—\$89,092
Stover Lock Nut & Machinery Corp., Easton, Pa.
Hardware—5,455,000—\$29,772

— T —

Tell & Henson Co., Detroit, Mich.
Vehicle parts—2000—\$56,850
Thompson Products, Inc., Cleveland, Ohio
Pump assy—Various—\$52,992
Titellex Inc., Newark, N. J.
Parts—Various—\$1,379,369
Tobe Deutschmann Corp., Norwood, Mass.
Vehicle parts—3000—\$50,400
Trainor National Spring Co., New Castle, Ind.
Vehicle parts—101,225—\$97,533
Tulsa Winch, Vickers Inc., Tulsa, Okla.
Hardware
Vehicle parts—200—\$72,400

— U —

United Aircraft Corp., Hamilton Standard Div., E. Hartford, Conn.
Maintenance parts—Various—\$350,288
Parts—Various—\$51,017
Maintenance parts—Various—\$111,912

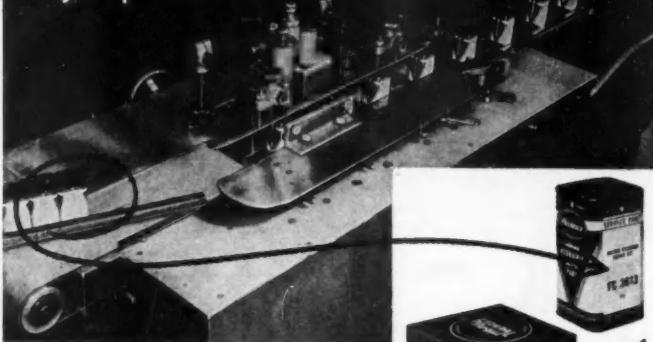
United Aircraft Corp., Pratt & Whitney Aircraft Div., E. Hartford, Conn.
Spare parts—Various—\$158,529
Spare parts—Various—\$26,802
Spare parts—Various—\$6,418,716
Spare parts—Various—\$88,279
Bearing—Various—\$34,194
Spare parts—Various—\$94,939
Spare parts—Various—\$5,126,435
Special tools—Various—\$669,307
Tools—Various—\$49,733
Spare parts—Various—\$6,502,460
Spare parts—Various—\$170,634
Spare parts—Various—\$204,742
Brackets—660 ea—\$73,148
Spare parts—Various—\$30,214
Maintenance parts—Various—\$702,551
Tools—Various—\$702,551
Tools—Various—\$28,500
Spare parts—Various—\$2,413,867
Blade assy—225 ea—\$356,625
Installation equipment—Various—\$207,212
Parts—Various—\$1,700,672
Spare parts—3614 ea—\$109,287
Parts—Various—\$400,000
Spare parts—Various—\$3,682,042
Parts—Various—\$352,963
Parts—Various—\$175,000
Equipment—Various—\$200,787
Parts—200 sets—\$9,191,782
Spare parts—Various—\$289,355
Parts—Various—\$959,023
Afterburner—50 ea—\$49,500
Spare parts—Various—\$75,034
Spare parts—Various—\$28,513
Bearings—Various—\$16,431
Spare parts—Various—\$2,496,210
Tools—Various—\$668,401
Maintenance parts—Various—\$159,640
Special tools—Various—\$569,313
Parts—Various—\$1,570,491
Kit assy—2200 ea—\$165,313
Pistons—16,518 ea—\$256,690
Blade assy's—319 ea—\$478,500

United Motor Service Div., General Motors Corp., Detroit, Mich.
Vehicle parts—1000—\$40,580
Spare parts—Various—\$38,486
United States Rubber Co., Detroit, Mich.
Hardware—2,198,357—\$490,939

— V —

Vinson Mfg. Co., Van Nuys, Calif.
Valve assy—265 ea—\$48,294

How much can your company save...by printing packages as you pack them?



Do you use completely preprinted packages for each individual part or accessory you make? Or do you use a common package for a variety of products, imprinting or labeling it in a separate operation? Either way you can cut costs considerably and do a more efficient job with a Gottscho MARKOCODER automatic package printing machine.

Set up in either a hand-pack or mechanized packaging line the MARKOCODER prints name, number, model application, other product identification on one or more blank panels of a partially-printed container...automatically...as an integral packaging function. It delivers accurately registered "print-quality" impressions on cartons, boxes, cans or containers...on top, ends or bottom—permits quick, easy change-over for new copy, packages of different size.

Find out how other packagers of parts and accessories are using the Gottscho MARKOCODER to slash package inventories and save storage space, eliminate a cause of production line down-time, reduce packaging labor costs, reduce cost of packages, cut losses from package obsolescence, simplify inventory control, etc. Send for our MARKOCODER Brochure "APM" today.



ADOLPH GOTTSCHO, INC., Hillside 5, N.J.

Machines to MARK whatever you MAKE

**SIGN OF SUPERIORITY
SYMBOL OF SINCERITY**



THE SEASON'S SINCEREST GREETINGS TO AMERICA'S GREAT INDUSTRIES

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iron hand
makes expensive
presses
pay off better

"This machine cost \$38,000.00," says the sign. That's a big investment in a press. One sure way to get a better return on this investment is to keep the press operating at full-cycle capacity. And that calls for *fully-automatic* unloading of stampings with the Sahlin "Iron Hand."

The "Iron Hand" saves you dollars in other ways, too: reduces accident rates... increases manhour productivity by releasing press attendants for other work.

At the F. W. Lawson Company, Cincinnati, for example, an "Iron Hand" was installed on a hydraulic press that produces ash can bodies. Manpower savings alone came to *more than \$3000* a year. And M. C. Lumley, General Superintendent at Lawson, added: "I find the 'Iron Hand' a *good production tool*, designed and built to withstand *constant operation*."

Sahlin "Iron Hands" are cutting costs and speeding production all over the world. Learn how you can get maximum production from your presses. Write today for our illustrated catalog.

Representatives in:
Buffalo
Indianapolis
Pittsburgh
Cleveland
Dayton
San Francisco
Seattle
Los Angeles
Bala-Cynwyd (Philadelphia)
London
Paris
Milan

sahlin
engineering company
267 Ferndale Street, Birmingham, Michigan

(Continued from page 136)

— W —

Warner Gear Div., Borg-Warner Corp.,
Muncie, Ind.

Vehicle parts—27,000—\$57,640

Westinghouse Electric Corp., Aviation
Gas Turbine Div., Phila., Pa.
Maintenance parts—Various—\$264,-
934

Thermo-Cable—Various—149,311
Items for engines—Various—\$135,-
702

Spare parts—Various—\$103,904
Maintenance parts—Various—\$116,-
063

Maintenance parts—Various—\$100,-
703

White Motor Co., Cleveland, Ohio
Vehicle parts—156—\$61,019

White Rodgers Electric Co., St. Louis,
Mo.
Actuators—474 ea—\$96,725

Wm. R. Whittaker Co., Ltd., Los Angeles, Calif.
Hydraulic control valve—60 ea—\$41,-
322

Valve assys—50 ea—\$85,314

Wm. R. Whittaker Co., Ltd., Los Angeles, Calif.
Valves & cylinder—35 ea—\$25,005

Willys-Overland Motors, Inc., Toledo,
Ohio
Vehicle parts—11,000—\$29,500

Willys-Overland Motors, Inc., Toledo,
Ohio
Vehicle parts—40,000—\$113,200

Trailmobile Expands

Trailmobile, Inc., has just inaugurated an extensive program of expansion of its production facilities and re-layout of its present Cincinnati, O., plant, it was announced recently.

Actual work on the expansion program has begun and will continue through the first six months of 1953, at a total cost of more than \$1 million. The program includes a considerable enlargement of the company's engineering department, the removal of the service parts department from the main plant in Oakley to a new location, and the utilization of the additional space thus provided for expanded production facilities.

Sets Speed Record

An F-86D Sabrejet broke the world speed record for operational aircraft with a semi-official speed of 699.9 mph. Piloted by Air Force Capt. Slade Nash, the run was made at Salton Sea, Calif. He surpassed the previous record of 670.9 mph. Capt. Slade's fastest run of the required four passes at low altitude (below sea level) was timed at 702.6 mph. The four passes were timed at 698.4, 698.0, 702.6, and 700.4.



we pay attention to the little things

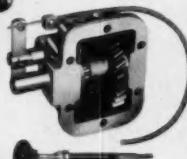
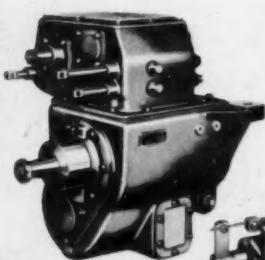
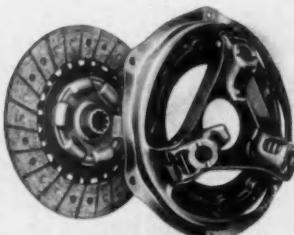
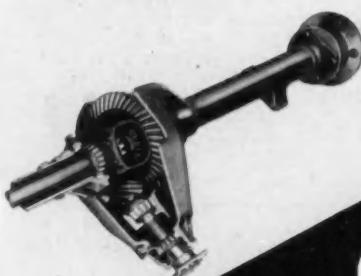
A sage once said "Take care of the little things, and the big things will take care of themselves." Not entirely true. But there's a great deal of common sense in the thought. We, at Spicer, subscribe to it in principle and in practice.

Spicer is big. Big in our way of thinking. Big in our way of producing. Big in our way of watching what's going on. From the engineering department to the shipping platform, we pay attention to the little things... because we know they mean big things to you.



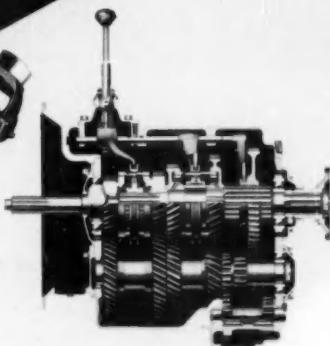
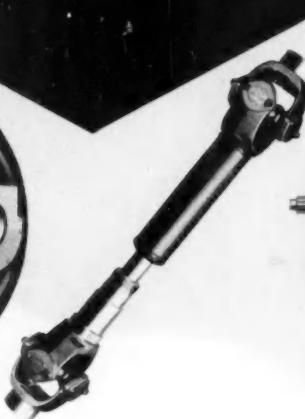
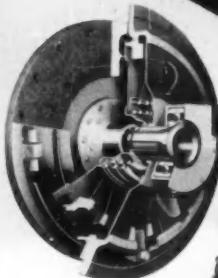
Spicer

SPECIALISTS IN SERVICE



Spicer

The BIG name in automotive power transmission equipment



The designing and manufacturing skill gained from producing millions and millions of Spicer units is used by a majority of manufacturers in the truck, bus, tractor and passenger car fields. These Spicer products are built in modern plants that employ the industry's most advanced production equipment and techniques. Spicer . . . and Spicer alone . . . offers you a complete range of products covering every need in the automotive power transmission field. Look to Spicer for assistance that perseveres all the way from the drawing board through to service in the field.

SPICER MANUFACTURING

Division of Dana Corporation • TOLEDO 1, OHIO



TRANSMISSIONS • UNIVERSAL JOINTS • BROWN-LIFE AND AUBURN CLUTCHES • FORGINGS • PASSENGER CAR AXLES • STAMPINGS • SPICER "BROWN-LIFE" GEAR BOXES • PARISH FRAMES • TORQUE CONVERTERS • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES

Industry News

(Continued from page 23)

Newark Tank Plant to be Expanded

Chrysler Corp. will operate a \$3.1 million tank modification plant which is expected to be in partial operation at Newark, Del., by April 1.

Designed for employment of 400 persons, the facility will become an integral part of the Chrysler Delaware tank plant at Newark. It will be used for making any modifications required on products of the tank plant, installation of on-vehicle equipment, and preparation of tanks for shipment to the field. The Army expects the plant to be in full operation by July 1.

French Production Up

During the first nine months of this year French automobile production was 371,331 units, being an increase of 15.7 per cent over the corresponding period of 1951. All the increase is in passenger cars, there being a decline in both trucks and buses. Renault continues to lead in all classes, followed by Citroen, Simca and Peugeot. Chausson is the largest producer of buses.

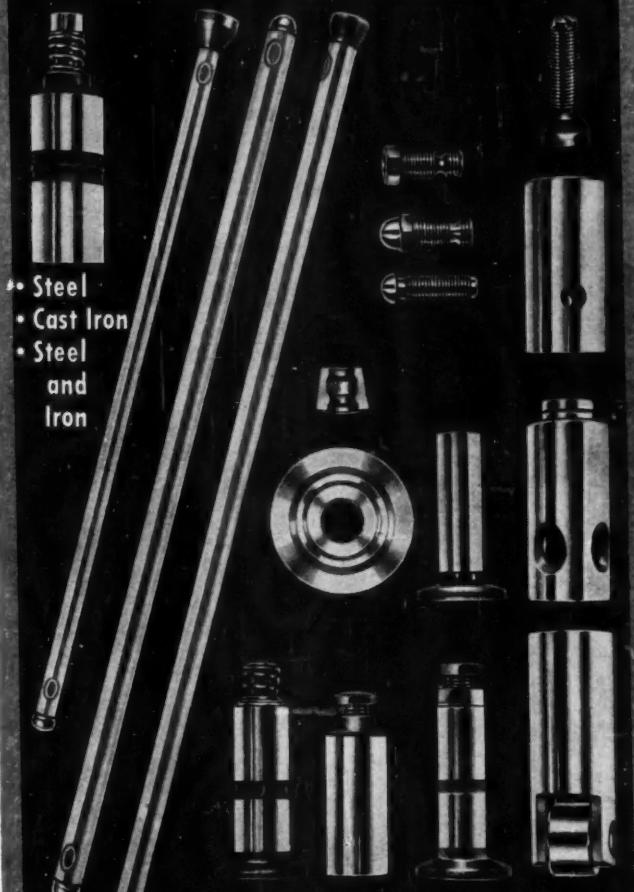
Negotiations are under way between the Government of Israel and the Chausson Co. for the assembly of Chausson buses in Palestine. Israel has purchased 200 Chausson buses through the Kaiser-Frazer organization. The Chausson bus is of all-steel unitized construction, under Budd license; only the assembly welding of stampings would be undertaken in Israel. The mechanical components would be produced in France in Chausson-controlled factories, and would be exported separately.

BRM Dissolved

British Racing Motors, Ltd., the industry-sponsored group organized to produce a racing car to represent British automobile manufacturers, has been liquidated. Attempts to produce a 91 1/2-cu. in. supercharged racing car failed, reportedly because of disagreements on the operating committee. Rubery Owen & Co., one of the last of the sponsors to remain strong to the end, purchased the assets, and will build a non-supercharged engine of 152.5 cu. in. displacement and 250 hp to meet the new racing formula which goes into effect in 1954.

(Turn to page 150, please)

"CHICAGO" precision valve gear parts



Hydraulic Tappets • Mechanical Tappets • Roller Followers • Push Rods • Self Locking and Standard Thread Adjusting Screws • Valve Spring Retainers • Split Valve Locks • Rocker Arm Shafts

| | |
|-------------------------------------|----------------------------------|
| Connecting Rod Bolts..... | Hydraulic Cylinder Pistons..... |
| Cylinder Head Studs..... | Cylinder Head Cap Screws..... |
| Main Bearing Studs..... | Main Bearing Cap Screws..... |
| Flywheel to Crankshaft Screws..... | Diesel Energy Cells..... |
| Wheel Bolts and Studs..... | Differential Carrier Screws..... |
| Oil Pump to Distributor Shafts..... | Remote Control Levers..... |
| Automatic Transmission Valves..... | Water Pump Shafts..... |

Special Screw Machine Parts $\frac{1}{8}$ " to
5" Diameter • Cap Screws • Set
Screws • Nuts • Studs • Taper Pins
• Socket Screw Products

The CHICAGO
SCREW COMPANY
2801 WASHINGTON BLVD.
BELLWOOD, ILL.
Established 1872

New Defense Facilities

SUPPLEMENTING the list of certificates of Necessity issued up to October 22 authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the November 15 issue, page 146, of **AUTOMOTIVE INDUSTRIES**, the following additional certificates were announced by the Defense Production

Administration, Oct. 22 to Nov. 12.

Included in this latest tabulation, 14,423 new or expanded defense facilities of all types have been authorized for rapid tax write-off, the total amount eligible for amortization being \$23,287,285,000. These figures are exclusive of cases that are up for later review but included in this list—in these cases no dollar amount is

listed. The figure appearing in parentheses is the percentage authorized for actual fast tax write-off.

— A —

The Ace Machine Co., Inc., New London City, Conn.

Aircraft parts—\$8,949 (70)

Aircraft Magnesium Heat Treating Co., Los Angeles, Calif.

Heat treating of magnesium castings \$57,848 (70)

Aircraft Products Co., Bridgeport, Pa.

Aircraft parts—\$21,788 (70)

Aluminum Co. of America, Davenport, Iowa

Tapered sheet & plate for aircraft
—\$1,250,000 (65)

American Brake Shoe Co., Azusa, Calif.

Ordnance—\$987,137 (60)

Anderson, Greenwood & Co., Houston, Tex.

Aircraft parts—\$99,199 (45)

Aviation Engineering Corp., Woodside, N. Y.

Aircraft parts—\$7,848 (70)

— B —

Bay State Steel Co., Wilmington, Mass.

Ordnance—\$57,435 (70)

Beech Aircraft Corp., Wichita, Kans.

Aircraft and parts—\$185,200 (50)

Bendix Aviation Corp., Towson, Md.

Electronic equipment—\$41,069 (65)

Boeing Airplane Co., Wichita, Kans.

Aircraft and aircraft parts—\$32,476 (45)

Boeing Airplane Co., Seattle, Wash.

Aircraft parts—\$487,124 (55)

Brace, Inc., Minneapolis, Minn.

Aircraft instruments—\$3,912 (70)

— C —

California Flyers School of Aeronautics, Inglewood, Calif.

Aircraft parts—\$55,000 (65)

Calmeec Manufacturing Co., Los Angeles, Calif.

Aircraft parts—\$84,000 (70)

Capital Industries, Seattle, Wash.

Ordnance—\$24,000 (70)

Champion Motors Co., New Brighton, Minn.

Aircraft parts—\$27,173 (70)

Continental Aviation & Engineering Corp., Detroit, Mich.

Aircraft parts—\$90,000 (50)

— D —

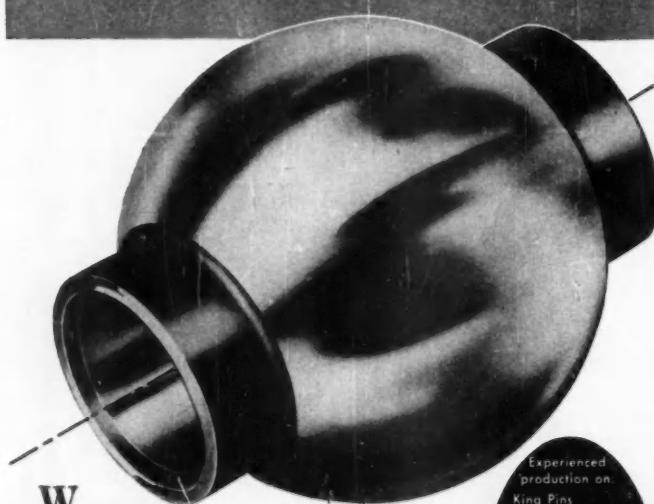
Detroit Plastic Engineering Co., Base Line, Mich.

Ordnance—\$39,679 (45)

Douglas Aircraft Co., Inc., Long Beach, Calif.

Aircraft products—\$70,589 (60)

Specialized Production of HARDENED & GROUND PARTS



When you've served the automotive industry for more than 40 years as we have done, you become quite adept at machining difficult pieces like the Beam Ball shown here.

Ball O.D. is ground to $3.375^{\circ} \pm .001$; Bore, to $1.375^{\circ} \pm .001$. Circular contour is absolutely concentric with bore centerline. Scientifically controlled heat treating provides exceptional surface hardness and consistent strength throughout. The specified finish is Parker-Lubrizing, as used on many of our products.

This is a sample of the metallurgical engineering, precision grinding and uniform quality that can be readily applied to mass production of your turned, hardened and ground parts. Let us quote on your requirements. Write or wire today.

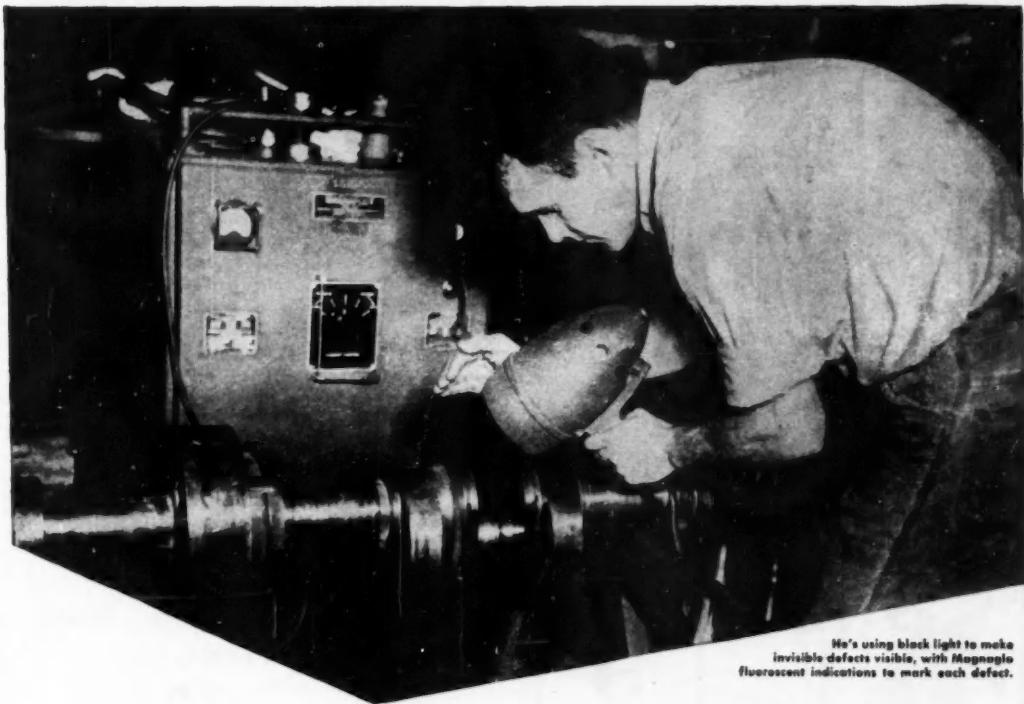
Henry W. Brown
PRESIDENT

THE BROWN CORP.

213 BELLEVUE AVE.

SYRACUSE, N. Y.

C. H. Elkins, 3007 Glendale Rd., Cleveland • W. F. Seeger, 6718 Bellmead Rd., Detroit • R. G. Sanderson, 5000 N. Clark St., Chicago • Harry J. Windmiller, 1724 Carlton, East Berlin • John W. Wilson & Co., 1408 N. Figueroa St., Los Angeles, Calif. • John B. Hunt, 8011 S.E. Yamhill St., Portland, Ore.



He's using black light to make invisible defects visible, with Magnaflux fluorescent indications to mark each defect.

He's Looking for Dollars— and finding them!

HE'S finding dollars that are wasted when a machine breaks down . . . when its production stops . . . when AVOIDABLE EMERGENCY REPAIRS shoot costs sky-high.

His job is finding cracks and defects that are the cause of much equipment breakdown and many serious accidents. Because of his work, machines can be kept on the production line without costly interruption. He uses Magnaflux' equipment and methods.

Maintenance inspection with Magnaflux' Methods substitutes low cost prevention and correction for

high cost repair and rebuilding. It is saving important money for countless cost-minded companies. They now consider it as essential as any routine lubrication.

One or another of Magnaflux' many inspection methods can reduce your operating cost through effective, PREVENTIVE maintenance. A Magnaflux engineer is ready to help you.

Meanwhile, mail the coupon for your copy of the new free bulletin, "Good Maintenance is Prevention—Not Repair."

Magnaflux' Inspection Methods
detect the growing failure points in machines
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Please send me at no cost, a copy of your new bulletin, "Good Maintenance is Prevention—Not Repair."

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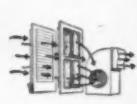
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SPRAY GUNS
38 different models



GUN NOZZLES
1050 combinations



AIR SUPPLY SYSTEMS
filtered, heated air



AIR COMPRESSORS
light, medium, heavy-duty



MATERIAL HANDLING
EQUIPMENT
3 models of pumps



PAINT CIRCULATING
SYSTEMS
for identical finishes



SPRAY BOOTHS
over 510 styles and sizes



AUTOMATIC
SPRAYING
EQUIPMENT
for lower production costs



OIL AND
WATER
EXTRACTORS
7 models
to supply
clean, dry air



MATERIAL TANKS
2 to 60 gallons



AIR & MATERIAL HOSE
12 types

1069 standard products to solve your finishing problems!

Whether you need help in applying special finishes or coatings to military items or glistening finishes to civilian products...whether you want to spray tar-like sound deadeners or light coats of paint...whether you want to finish automatically at high speed or just do occasional maintenance painting...in short, no matter what your finishing problem, you can get all the spraying equipment you need

from 1 source, Binks.

Moreover, Binks complete line of spray painting equipment saves you time and money because each item is standard. If you want special help in selecting or using Binks products, Binks Engineering Department is at your service, without obligation. Send in coupon or write Binks Manufacturing Co., 3120-30 Carroll Ave., West Chicago 12, Illinois, for full information.

Learn how to slash finishing costs! Mail coupon now!

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SPRAY PAINTING



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Gentlemen: Please rush me my FREE copy of your CATALOG-DATA BOOK NO. 955 containing product descriptions indicating how Binks equipment can help me.

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REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED PHONE DIRECTORY

— E —

Enkay Grinding Co., Inc., Los Angeles, Calif.

Aircraft parts—\$13,212 (70)

Ex-Cell-O Corporation, Lima, Ohio

Aircraft engine parts—\$71,074 (65)

— F —

Fairchild Engine & Airplane Corp., Bay Shore, N. Y.

Aircraft equipment—\$154,573 (65)

Fairchild Engine & Airplane Corp., Valley Stream, L. I., N. Y.

Aircraft products—\$16,397 (65)

Fairchild Engine & Airplane Corp., Wyandanch, L. I., N. Y.

Military end items—\$15,514 (65)

The Firestone Tire & Rubber Co., Akron, Ohio

Aircraft parts \$160,000 (40)

— G —

General Motors Corp., Lansing, Mich.

Aircraft parts—\$831,327 (65)

Given Manufacturing Co., Los Angeles, Calif.

Ordnance—\$162,549 (70)

Hesse-Eastern Corp., Cambridge, Mass.

Ordnance—\$3,808 (70)

— H —

Hicksville Machine Works, Hicksville, N. Y.

Aircraft parts—\$24,974 (70)

Hobbs Engineering Co., Highland Park, Mich.

Aircraft parts—\$106,363 (65)

Houdeille-Hershey Corp., Buffalo, N. Y.

Aircraft parts—\$135,000 (40)

Howard Plating Industries, Inc., Royal Oak, Mich.

Aircraft & ordnance parts—\$39,779 (60)

— K —

C. B. Kaupp and Sons, Maplewood, N. J.

Aircraft parts—\$27,881 (70)

Kenmore Broach & Die Co., Inc., Cuyahoga, Ohio

Dies and precision aircraft parts—\$2,347 (70)

H. Koch & Sons, Marin County, Calif.

Components for aircraft and electronic—\$470,000 (25)

Korry Mfg. Co., Seattle, Wash.

Aircraft parts—\$9,000 (70)

— L —

Lansdowne Steel & Iron Co., Morton, Pa.

Ordnance—\$40,000 (45)

Lauderdale Turbine Products, Fort Lauderdale, Fla.

Aircraft parts—\$24,691 (85)

MORAINE-400 Bearings

When you include Moraine-400 bearings in your plans, bearing length is no longer a limiting factor in automotive engine design. If the shaft diameter is sufficient to carry the torque and journals are long enough for good oil-hole design, the resulting bearing areas will be ample to carry the load.

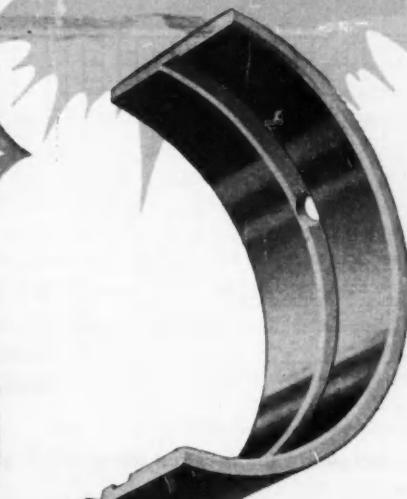
Corrosion resistance is improved; embedability and conformability are more than sufficient to meet conditions imposed by today's engines; load-carrying capacity is amazingly greater. To prove the toughness of the Moraine-400, we reduced bearing area by one-half—more than doubling the load—and ran an engine at full throttle for 100 hours. At the end of that test—as at the end of *all* tests—the bearings were in excellent condition.

Moraine-400 bearings are readily interchangeable with the bearings you're now using and are suitable for Tocco or oil-hardened shafts.

We will soon reach volume production on Moraine-400 bearings. Whether you want to increase the efficiency of your present engines, or remove design limitations from your engines of the future, it will pay you to look into the Moraine-400 now.

Moraine-400 is made by the manufacturers of the famous Durex-100 bearings—now used as original equipment on many of the nation's finest cars and trucks.

HERE IS
TOMORROW'S BEARING
—TODAY!



MORAINE PRODUCTS

Division of General Motors

DAYTON, OHIO

(Continued from page 144)

The M. S. Little Mfg. Co., Hartford, Conn.
Ordnance—\$7,732 (70)
Lockheed Aircraft Corp., Burbank, Calif.
Aircraft—\$13,449 (65)

— M —

Man-Sew Corp., New York, N. Y.
Aircraft parts—\$13,771 (70)
Metro Heat Treat Co., Ridgefield, N. J.
Heat treating of aircraft parts—\$2,086 (70)

Metwood Mfg. Corp., Gardena, Calif.
Aircraft parts—\$31,965 (70)
Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Ordnance—\$960,000 (40)

— N —

New Ray Products Co., Inc., Des Moines, Iowa
Aircraft parts—\$7,767 (70)

— P —

Phillips & Hiss Co., Inc., Hollywood, Calif.
Aircraft parts—\$38,200 (50)

Prospect Mold & Die Co., Cuyahoga Falls, Ohio
Aircraft and ordnance parts—\$4,788 (70)

— R —

J. B. Rea Co., Inc., West Los Angeles, Calif.
Aircraft components—\$82,100 (55)
Republic Aviation Corp., Long Island, N. Y.
Aircraft & aircraft parts—\$45,547 (40)
Rockford Acromatic Products Co., Rockford, Ill.
Ordnance—\$30,000 (70)

— S —

St. Louis Industries, Inc., St. Louis, Mo.
Ordnance—\$10,223 (70)
Spartan Aircraft Co., Tulsa, Okla.
Aircraft parts—\$23,150 (65)

— T —

Thompson Products, Inc., Cleveland, Ohio
Aircraft components—\$966,321 (65)
Aircraft components—\$250,000 (65)

— U —

Union Carbide & Carbon Corp., Cleveland, Ohio
Military batteries—\$264,000 (65)
United States Rubber Co., Providence, R. I.
Ordnance—\$20,873 (45)
United States Rubber Co., Woonsocket, R. I.
Ordnance—\$6,914 (45)

— W —

Worth Manufacturing Co., Los Angeles, Calif.
Aircraft parts—\$2,515 (70)

BOOKS ...

WELDABILITY OF METALS, published by *The Lincoln Electric Co.*, 22801 St. Clair Ave., Cleveland 17, O. Price, \$0.50. The publisher has reprinted in this 141-page book a section of his standard welding reference, "Procedure Handbook of Art Welding Design and Practice." The various types of carbon and alloy steels are described by giving nominal chemical analysis, properties, uses, and characteristics. The best welding procedure for each is completely detailed. American Welding Society specifications for electrodes used to weld are also listed. The same treatment is accorded to copper, aluminum, and nickel, as well as their various alloys. Cast iron, forgings, cast steel, wrought iron, ingot iron, galvanized steel, terne plate, and enameling stock are similarly covered. In addition, a thorough analysis of the principles and practices of hard-surfacing is presented. Complete tabular data, drawings, and pictures supplement the text.

Original Equipment on Many Leading Cars and Trucks

protect your good name
with another





By TOCCO*

Induction Hardening of Axle Shafts

WHAT progressive engineers at the Salisbury Axle Division of Dana Corporation have done with Induction Heating for hardening automotive axle shafts suggests comparable savings for your products. Note this report:

SAVINGS of \$375.00 per day caused by increased output and switch from SAE 4140 to SAE 1033 steel made possible by induction hardening.

LESS MACHINING time because shaft of SAE 1033 steel is completely machined prior to hardening. Tool cost cut in half—turning time reduced from 2 minutes to 30 seconds.

PRODUCTION DOUBLED. Formerly 50 axle shafts per hour with conventional combustion type heating—now 120 per hour with TOCCO.

PRODUCT IMPROVED. Torsional fatigue has increased 200%. The shaft is no longer a compromise between durability and machinability. It is hardened to 55 RC and drawn back to 43-47 RC. Degree of hardness and depth is accurately controlled.

TOCCO Engineers will gladly survey *your* operations for similar cost-cutting results in hardening, heat-treating or brazing—without obligation.

THE OHIO CRANKSHAFT COMPANY



TOCCO

FREE
BULLETIN

Mail Coupon Today

THE OHIO CRANKSHAFT CO.,
Dept. H-12, Cleveland 1, Ohio

Please send copy of new bulletin,
"Principles of TOCCO Induction Hardening and Heat Treating".

Name _____

Position _____

Company _____

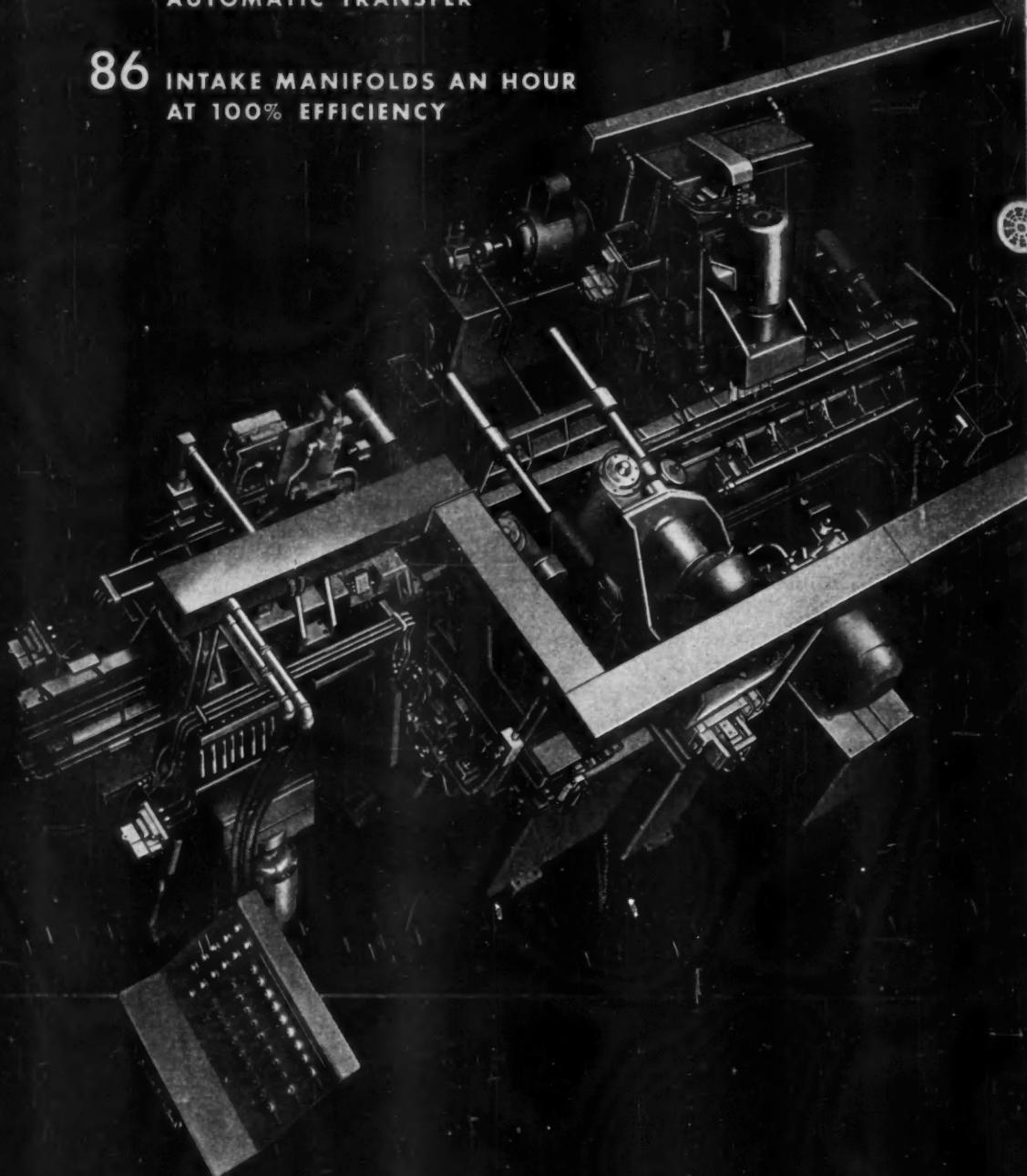
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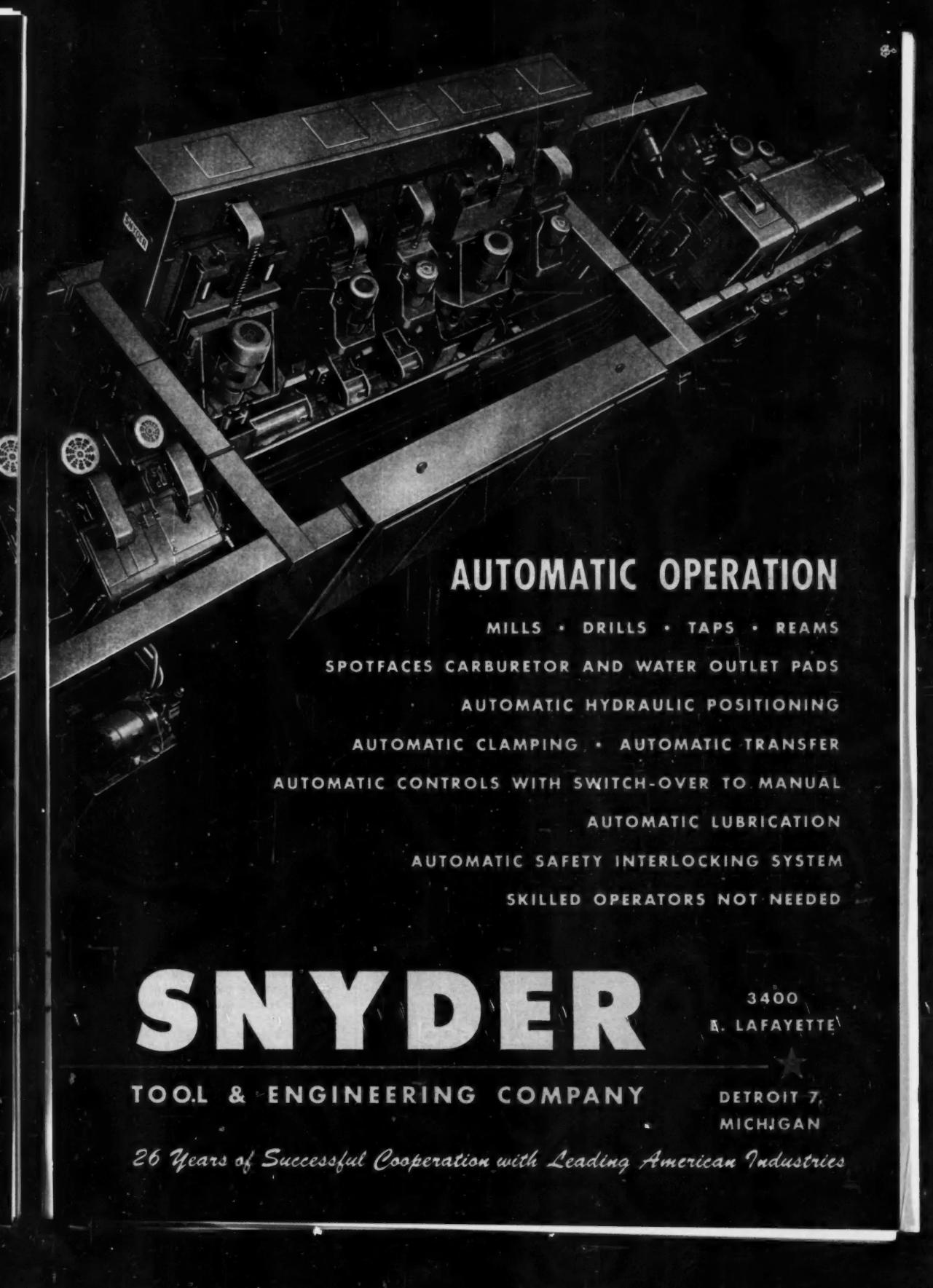
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SNYDER MACHINES CONTROL COSTS

22 STATION
AUTOMATIC TRANSFER

86 INTAKE MANIFOLDS AN HOUR
AT 100% EFFICIENCY





AUTOMATIC OPERATION

MILLS • DRILLS • TAPS • REAMS

SPOTFACES CARBURETOR AND WATER OUTLET PADS

AUTOMATIC HYDRAULIC POSITIONING

AUTOMATIC CLAMPING • AUTOMATIC TRANSFER

AUTOMATIC CONTROLS WITH SWITCH-OVER TO MANUAL

AUTOMATIC LUBRICATION

AUTOMATIC SAFETY INTERLOCKING SYSTEM

SKILLED OPERATORS NOT NEEDED

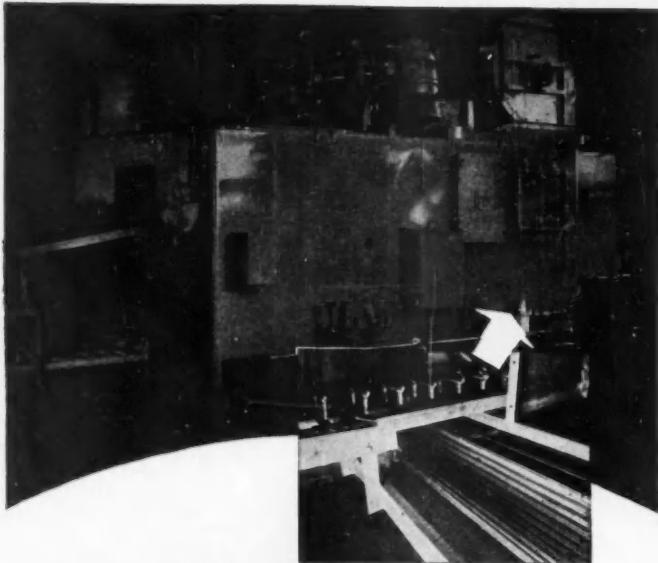
SNYDER

TOOL & ENGINEERING COMPANY

3400
A. LAFAYETTE

DETROIT 7,
MICHIGAN

26 Years of Successful Cooperation with Leading American Industries



use of PLATECOILS gives CENTRI-SPRAY WASHING MACHINES construction and sales advantages

In building several of these motor block washers for a large automobile manufacturer, Centri-Spray, Inc., Detroit, Michigan has found that the use of Platecoils has 6 important advantages.

- 1 Higher heat input per cubic foot for quicker heat-up.
- 2 Easier installation with Platecoil banks.
- 3 At least 90% of threaded pipe joints eliminated to reduce leakage problems.
- 4 Longer service without cleaning.
- 5 Less condensate trapping in Platecoil bank as compared with serpentine pipe coil.
- 6 No wire cutting in return bends through much lower steam and condensate velocity.

A bank of three 18 x 83 Platecoils is used instead of a pipe coil consisting of 42 pieces of one inch pipe 85" long, and two pieces 87" long. In addition 44 return bends were needed plus the straps and separate tie bars required. Use of the Platecoils not only simplifies fabrication for Centri-Spray, but it also gives their customer a more efficient, dependable washer.

Why not investigate using Platecoils in your products? You will find, as other manufacturers have, that Platecoils save time in estimating . . . that Platecoils save time and labor in fabrication . . . and that customers are better satisfied with Platecoil performance. Write today for Bulletin P74.



Industry News

(Continued from page 141)

Air Force Takes Delivery of New Republic Fighter

The first plane of a new series of high-speed swept-wing jet fighters—F-84F Thunderstorms—to come off the production line at Republic Aviation Corp. was accepted by the Air Force on Dec. 3. The F-84F is an advanced development of the Thunderjet fighter-bomber series. The new plane is in the over-600-mph class and is capable of long-range performance. In addition to its normal armament of six .50-cal machine guns and ammunition, it can carry a greater external armament and fuel load than previous models of the F-84. Four guns are mounted in the nose and one each in each wing root.

The "F" is also being equipped with in-flight refueling equipment and will be capable of operations similar to the ocean-hopping performance of its predecessor model, the F-84G. The latest model is powered by the J-65. Large forgings are said to replace several previously built-up structures.

Canadian Firm Gets Approval On Transmission Fluid

General Motors Corp. has tested and approved specifications submitted by British American Oil Company, Ltd., for an automatic transmission fluid to be marketed in Canada. The oil was developed after a three-year research program aimed at developing a transmission lubricant satisfactory for automatic drive requirements and with a wide range of viscosity to meet Canadian climatic conditions. Until the new transmission fluid was developed it was thought that two separate types might have to be produced—one each for summer and winter driving. The new product will stand temperatures ranging from 360 F to -45 F.

Furnace Installed

Consolidated Industries, Inc., of West Cheshire, Conn., has completed installation of new aging furnaces that will double the capacity of the plant to heat treat aluminum forgings.

Specializing in forgings of aluminum and titanium, Consolidated has repeatedly found it necessary to expand its facilities. It is now employing six times as many people as two years ago.

(Turn to page 155, please)



YALE & TOWNE LIFT TRUCK "PICKS-UP"

Double Savings Payload

...51% on the Cluster Instrument Panel Installation

...44% on Conduit Installation for the Motor Hoist

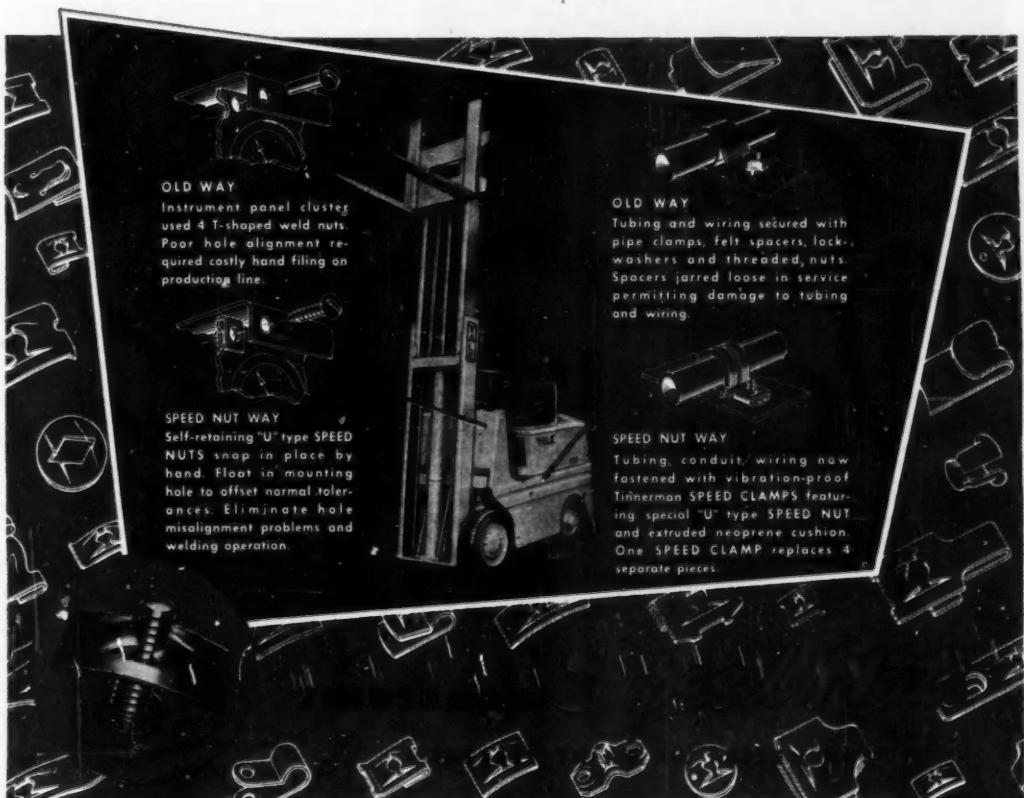
THE heavy-duty lifting and hauling performance I expected of these Yale Industrial Lift Trucks means that they must be assembled with fasteners that can take it. That's why engineers at Yale & Towne Manufacturing Company, Philadelphia, Pa. chose SPEED NUTS and SPEED CLAMPS® over all other methods.

They found that Tinnerman self-retaining SPEED NUTS provide rugged, vibration-proof attachments, cut materials handling, and reduce assembly costs! The result in this case was an amazing "double savings payload" of 51%, and 44% in production costs, plus a whopping savings in materials!

Big production savings like these can be yours. A Tinnerman Fastening Analysis on your products may provide the answer...ask the Tinnerman representative in your area for full information on this important engineering service.

No matter what you assemble or build, it will pay you to turn to Tinnerman for better fastening engineering! Write today for your copy of the new "Savings Stories" booklet. TINNERMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, Ohio.

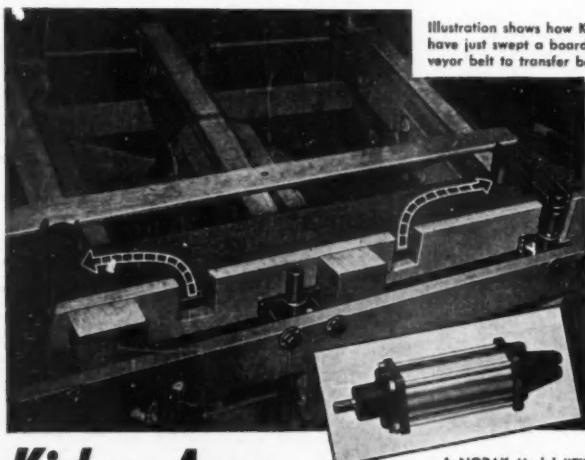
In Canada: Dominion Fasteners Ltd., Hamilton, Ontario. In Great Britain: Simmonds Aerocessories, Ltd., Treforest, Wales. In France: Aerocessaires Simmonds, S.A. — 7 rue Henri Barbusse, Levallois (Seine.)



Optical Dividing Head

Recently marketed is an optical dividing head with a face plate capacity of over 48 in. That is said to make it possible to locate and make settings to an accuracy of three seconds for machining large jet engine components. It repeats settings in either direction, and the base of the dividing head is so designed it can easily be set up for either smaller or greater swing as required.

Settings are entirely by optical means. A circular scale on which degree lines are etched, from 0 to 359 F, is illuminated and degree lines are magnified and projected onto a ground glass screen. Minutes and seconds are present on a circular dial marked in 15 second divisions, and degrees are aligned between reference marks on the screen. *F. T. Griswold Mfg. Co., Devon, Pa.*



Kicker Arms... Powered by NOPAK Cylinders

... sweep boards from Conveyor to Transfer Belts

An important phase of the panel-gluing operation at Potlatch Forests, Inc., Lewiston, Idaho, is the transfer of boards coming from the glue applicator on a conveyor belt to the transfer belts which deliver them to the electronic gluer.

As each board hits the "bumper", a solenoid valve, controlled by a microswitch, actuates a NOPAK Model "E" Cylinder. The cylinder piston rod is coupled by bell-crank linkage to roller-tipped kicker arms which swing in a horizontal arc over the conveyor belt to sweep the board off the conveyor belt to the transfer belts which run at right angles to it.

This materials-handling operation is typical of many similar applications in which NOPAK Valves and Cylinders are used. For others see the NOPAK Application Manual.

GALLAND-HENNING MFG. CO., 2774 S. 31st St. • Milwaukee 46, Wis.

Refer to Sweet's File for
Product Designers or write
for Bulletin SW-1.

•
Representatives in Principal
Cities

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

A 7250-1/2-I-A

CALENDAR OF COMING SHOWS AND MEETINGS

| | |
|--|----------------|
| 43rd National Motor Boat Show, Grand Central Palace, New York, N. Y. | Jan. 9-17 |
| SAE Annual Meeting, Sheraton- Cadillac Hotel, Detroit, Mich. Jan. 12-16 | |
| American Management Association General Management Conference, Hotel Statler, Los Angeles, Calif. | Jan. 12-15 |
| Brussels Automobile & Truck Show, Brussels, Belgium. Jan. 17-28 | |
| Plant Maintenance Show, Public Auditorium, Cleveland, Ohio Jan. 19-22 | |
| Monte-Carlo Rally, Europe | Jan. 20-27 |
| 12th Annual Convention, Truck- Trailer Mfg. Association, Edgewater Park, Miss. | Jan. 26-28 |
| 30th International Automobile Show, Pacific Auditorium, Los Angeles, Calif. | Jan. 30-Feb. 8 |
| Western Computer Conference, Hotel Statler, Los Angeles, Calif. | Feb. 4-6 |
| National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y. | Feb. 24-27 |
| Pacific Automotive Show, Civic Auditorium, San Francisco, Calif. | Feb. 26-Mar. 1 |
| American Society for Testing Materials, Spring Meeting, Detroit, Mich. | Mar. 2-6 |
| SAE National Passenger Car Body and Materials Meeting, Sheraton- Cadillac, Detroit, Mich. | Mar. 3-5 |
| Geneva Automobile & Truck Show, Geneva, Switzerland | Mar. 5-15 |
| National Association of Corrosion Engineers Ninth Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill. | Mar. 16-20 |
| German Vehicle Show, Frankfurt, Germany | Mar. 19-29 |
| 27th Automobile Show, Civic Auditorium, San Francisco, Calif. | Mar. 21-29 |
| Eighth Western Metal Congress, Pan-Pacific Auditorium, Los Angeles, Calif. | Mar. 23-27 |
| International Magnesium Exposition, National Guard Armory, Wash- ington, D. C. | Mar. 31-Apr. 2 |
| 2nd Annual International Motor Sports Show, Grand Central Palace, New York, N. Y. | Apr. 4-12 |
| Auto-Lite Easter Automobile Show, Waldorf-Astoria, New York, N. Y. | Apr. 6-11 |
| Annual Turin Automobile Show, Turin, Italy | Apr. 22-May 8 |
| British Industries Fair, London and Birmingham, England. | Apr. 27-May 8 |
| Fifth Materials Handling Exposition, Convention Hall, Philadelphia, Pa. | May 18-22 |
| American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J. | June 29-July |
| Eighth National Instrument Conference and Exhibit, Chicago, Ill. | Sept. 21-25 |

YOUR C-D-F SALES ENGINEER *is a good man to know!*

Here's the man trained to solve your materials specification problems in plastics. He knows what's new with C-D-F and how you can use the service proved C-D-F non-metallic materials.

The way he sells is to help you... his wide technical background in the electrical and mechanical industries helps you avoid design pitfalls, can point out production shortcuts; that's why you should call him in when a new product is on the board.

Under his hat and in his case is the information you must have to meet competition and to build a better product. Backed up by the practical experience and research of C-D-F's six plants, it's no wonder it makes common sense to see the man from C-D-F (Sales offices in principal cities). *He's a good man to know.*

● ACROSS THE BOARD



C-D-F plastics have special characteristics, can meet close tolerances, rigid specifications. Learn the facts, get the complete story from the man from C-D-F.

● OVER THE DESK



When talking prices and delivery, you get action, not promises. The C-D-F salesman takes a personal interest in your problems... "follows through" on your order.

● IN THE SHOP



Whether it's our plant or yours, here's a man with a quick eye for cutting costs, improving quality. Years of practical training plus imagination=Your C-D-F salesman.

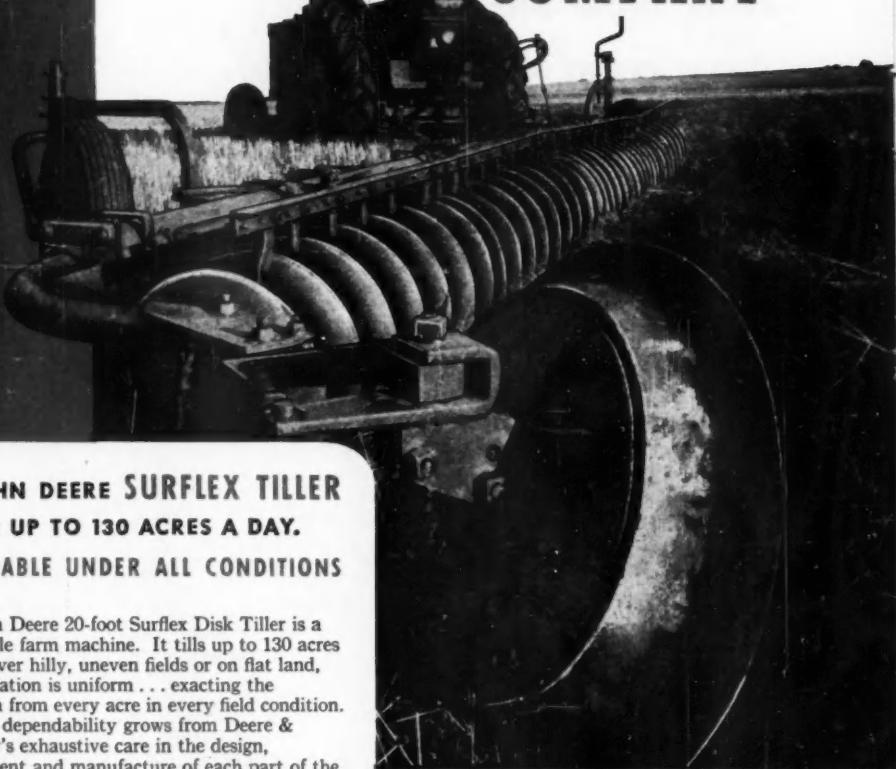


Continental-Diamond Fibre Company
NEWARK 2, DELAWARE

THE SEAL OF
COOPERATIVE
RESEARCH



In cooperation with  DEERE &
COMPANY



**The JOHN DEERE SURFLEX TILLER
WORKS UP TO 130 ACRES A DAY.
DEPENDABLE UNDER ALL CONDITIONS**

This John Deere 20-foot Surflex Disk Tiller is a remarkable farm machine. It tills up to 130 acres a day. Over hilly, uneven fields or on flat land, its penetration is uniform . . . exacting the maximum from every acre in every field condition.

Surflex dependability grows from Deere & Company's exhaustive care in the design, development and manufacture of each part of the unit. Each of the disk bearings, for example, is protected by a C/R Type "V" diaphragm oil seal with a leather sealing surface. Obviously, these seals must exclude every trace of the ever-present dirt in which the tiller operates.

As is the case with all C/R "Perfect" oil seals, those for the John Deere Surflex Disk Tiller were developed in cooperation with the manufacturer's engineers.

Each C/R seal is designed to do a specific job of protecting bearings under a variety of tough operating conditions. And, each C/R seal does that job as well as it can be done.

That's why, when you have a problem of lubricant retention, or foreign matter exclusion, it will pay you to check with C/R engineers *first*.

P. S. For immediate delivery, C/R "Perfect" oil seals are stocked in over 1800 sizes covering 15 different types.

The cooperative research and engineering services which C/R has provided in producing special C/R oil seals (both synthetic rubber and leather) for leading manufacturers are available to you. We will be pleased to send you any information you wish. *Brochure on request.*

CHICAGO KEYHIDE MANUFACTURING CO.
(210 Dade Avenue, OIL SEAL DIVISION, Chicago 22, Illinois)



**PERFECT
Oil Seals**

SIRVYS

Mechanical Leather Products

Boots, diaphragms, packings and other products give dependable service under difficult operating conditions.



SIRVENE

The Scientifically
Compounded Elastomer

Custom-engineered and custom-built for critical service in aircraft, automotive and other mechanisms.



Representatives in these Principal Cities

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Philadelphia • Pittsburgh • Cincinnati
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Minneapolis • Kansas City • Houston
Los Angeles • San Francisco

Industry News

(Continued from page 150)

Repair Parts Business Slightly Behind 1951

The automotive replacement parts industry expects to wind up this year only five to six per cent behind a year ago, an excellent showing in view of the long steel strike and other production difficulties. Sales have been especially good in the last few weeks and the outlook for 1953 is for business to be about ten per cent ahead of this year.



BARS FLY

Ree Motors, Inc., modernized its bar stock unloading dock with several heavy duty craneways. Bulldog Tro-E-Duct furnishes power to the various hoists.

New British Jet Engine

Details have been released of a new jet engine soon to be in super priority production for a super priority aircraft. This is the Armstrong Siddeley turboprop known as the ASMD3, which will be used in the Fairey Gannet naval anti-submarine aircraft. It is an improved version of the Double Mamba.

The new engine consists of two side-by-side engines, each known as an ASMA5, the total unit driving counter-rotating co-axial four-bladed airscrews. Each engine is a separate power unit with its own fuel, lubrication and control systems. The long periods of patrol are carried out with only one engine operating. Following take-off at full power, the aircraft can cruise economically on either of the engines, the other being stopped. It has been adapted to run on Diesel oil, kerosene, wide-cut turbine fuel, or any mixture of the three.

The ASMD3 has a take-off power rating of 2920 shaft hp plus 535 lb thrust which totals 3125 estimated hp.

(Turn to page 156, please)

GEARS



A Plus Value in Any Product!



IF GEARS are a part of the machines you make, there is no finer recommendation for YOUR PRODUCT than to be able to say it is "Equipped with FAIRFIELD GEARS!"

At Fairfield, your gears are in the hands of specialists equipped with every modern facility for producing fine gears efficiently and economically. *For the Best in Gears, Specify Fairfield!*

Gears made to order:

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TO THE WORLD IN GENERAL

and to you in particular . . .

Merry Christmas

AND A HAPPY NEW YEAR

At this season it behooves all of us to look back over the past year to the many accomplishments which have come about in our organizations and review the situation as to betterment of productive capacities for the coming year. A job well done can usually be improved upon and with the new year, it is well to consider equipment and modern manufacturing methods with their attendant savings in cost.

Consider then the advantages which Bullard equipment listed on the following page may afford you in your plant operation during the year 1953 and many years to follow.

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT



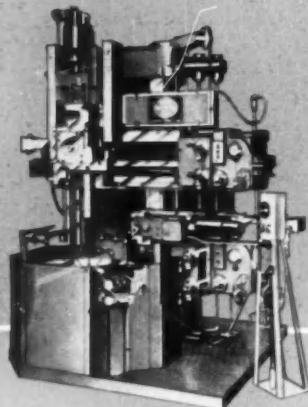
BULLARD



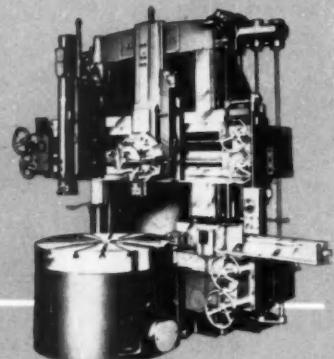
MANUFACTURERS OF MULT-AU-MATICS, CUT MASTER
AND MAN-AU-TROL VERTICAL TURRET LATHES, SPACING TABLES,
AND HORIZONTAL BORING, MILLING AND DRILLING MACHINES.

BULLARD MACHINE TOOLS

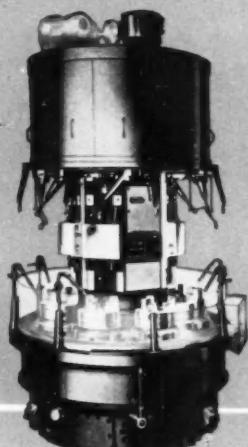
FOR GREATER MANUFACTURING ECONOMY



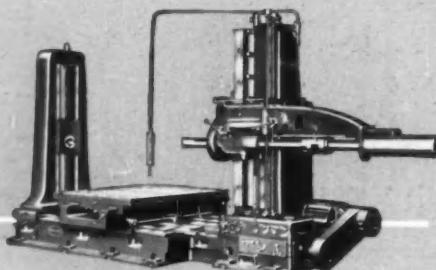
Man-Au-Trol Vertical Turret Lathe
30" - 36" - 42" - 54" - 64" and 74" sizes



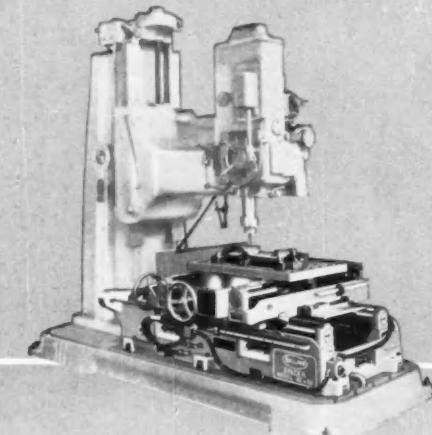
30" and 36" Cut Master
Vertical Turret Lathe with two heads
42" - 54" - 64" and 74" available
with several combinations of heads



Multi-Au-Matic Type "D"
with a wide range of sizes
and numbers of spindles



4" and 5" Spindle
Bullard Horizontal Boring, Milling and
Drilling Machines with 4-Way bed



30 x 20 Spacing Table mounted on Super
Service Drilling Machines. It may also be
mounted on 4' - 5' or 6' Radial Drills

Bullard's variety of machine
types covers a wide range of
requirements. For the diversi-
fied industries

Industry Selects BULLARD
Equipment for its MANUFAC-
TURING EFFICIENCY

BULLARD

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

MEN in the NEWS

(Continued from page 25)

Houdaille-Hershey Corp.—A. P. Fergusson and E. L. Potter have been appointed to the newly-created positions of assistant managers of sales, in charge respectively of automotive sales and non-automotive sales.

Solar Aircraft Co.—Clyde W. Seymour has become assistant manager of the manufacturing division. He is succeeded as manager of production control by W. Robert Bruce.

A. V. Roe Canada—Val Cronstedt has been appointed director of engineering of the gas turbine division.

Gabriel Co.—R. H. Whisler, Jr., is now chief engineer of the Gabriel Div.

Goodyear Atomic Corp.—Recent appointments included Oka Carlson, superintendent of cascade operations; Jay B. Mitchelson, superintendent of chemical operations; John R. Arndt, superintendent of product plant operations, and Arthur H. Wernecke, superintendent of the uranium control department.

Martin Senour Paint Co.—Wally J. Baye was named automotive customer service manager.

General Electric Co.—Two appointments in the control department are Frederic H. Holt, manager of marketing, and James W. Cooke, manager of engineering.

Bingham - Herbrand Corp.—C. T. Everett is now assistant manager of the forging and aviation divisions.

Consolidated Engineering Corp.—Victor J. Pollock was named controller recently.

Northrop Aircraft, Inc.—Edgar Schmued has been appointed technical assistant to the president.

Link Aviation, Inc.—William H. Wood is now vice-president in charge of engineering.

Minneapolis-Honeywell Regulator Co.—Stephen F. Keating was promoted recently to assistant to the president.

(Turn to page 160, please)

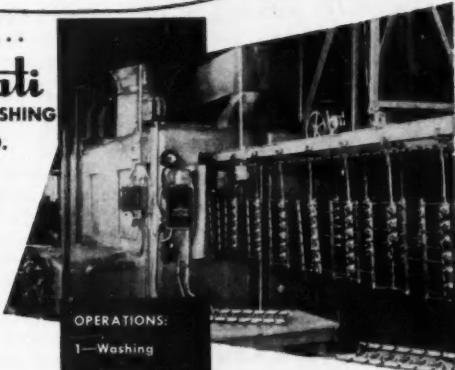
Completely Finished . . .

1000 PARTS PER HOUR
in Space 16' x 40'

ENGINEERED BY . . .

Cincinnati
CLEANING AND FINISHING
MACHINERY CO.

at The
George R. Carter Co.
Detroit, Mich.



OPERATIONS:

- 1—Washing
- 2—Rinsing
- 3—Hot Air Blowoff
& Dry
- 4—Paint Spray
- 5—Paint Bake



Washing, Rinsing and Hot Air Blowoff

Unusually compact, this CINCINNATI-engineered small parts finishing system has proved to be a major improvement in the George R. Carter Company's production facilities. Complete finishing operations on automobile trim hardware parts are performed efficiently and quickly.

With a minimum of adaptation this Cincinnati system can handle a large variety of small parts. Representative installations have shown savings up to 75% in time and cost.



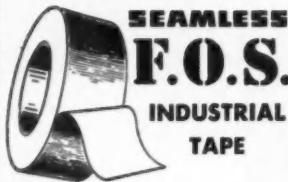
Write for your copy of the latest CINCINNATI catalog today!

Cincinnati CLEANING & FINISHING MACHINERY CO., INC.

315 HECLA STREET IRTON, OHIO

If you have an
**AUTOMOTIVE
PROBLEM**
in production, assembly, packaging,
shipping

You can save time
and money with
the proper use of



For masking, holding, packaging, backing, hinging, protecting, reinforcing, identifying, splicing, sound-proofing, insulating, stenciling, bundling, sealing, binding

**USE SEAMLESS
F.O.S. Industrial Tape**



Call or Wire

collect for authoritative advice and suggestions. Prices, catalogues, samples on request. Tape to meet govt. specifications. Wire details collect for 24-hour reply.

"Originators of
Pressure-Sensitive
Industrial Tapes"



WIRE INDUSTRIAL TAPE DIV. E
**THE SEAMLESS RUBBER
COMPANY**
NEW HAVEN 3, CONN., U. S. A.

MEN in the NEWS

(Continued from page 159)

Electric Storage Battery Co.—Appointment of Richard W. Havens as staff economist has been announced.

Boots Aircraft Nut Corp.—J. S. McHugh recently became manager of the new products division.

Bowers Battery & Spark Plug Co.—Dan S. Shipley was named sales manager, private brands.

Round Chain Cos.—Donald E. Ehlenfeldt is now advertising manager.

Hydropress, Inc.—H. Albers was promoted to chief engineer in charge of the Air Force heavy press program.

U. S. Rubber Co.—Carroll C. Parker has been appointed assistant manager of grinding wheel sales.

Ryan Aeronautical Co.—G. C. Danch has joined the company as executive assistant to the director of engineering, and Al Deyarmond has rejoined as chief of structures and aerodynamics.

Weber Aircraft Corp.—C. M. Poll has been appointed eastern representative.

Pacific Airmotive Corp.—Anthony J. Kreiner was recently named manager of manufacturing.

Link Welder Corp.—Harry Day was appointed vice-president recently.

American Car and Foundry Co.—Louis G. Raiche was named works manager of the St. Charles, Mo., plant.

Allegheny Ludlum Steel Co.—Promotion of J. Q. A. Doolittle to assistant to the manager of production was announced recently.

Alloy Precision Castings Co.—Ronald D. Gumbert was named executive vice-president.

Greer Hydraulics, Inc.—Leonard H. Seeman is the new assistant production manager in charge of production for the industrial division.

Ford Motor Co.—Appointment of Neal Anderson as controller of the Buffalo stamping plant has been announced.

PRECISION MADE

PHEOLL SCREWS
BOLTS, NUTS and
Special Fasteners...

save assembly time,
improve product strength
and final
appearance



ACCURATE THREADING SAVES TIME

Pheoll Screws, Bolts, and Nuts are easier to start, easier to drive and easier to tighten—because they're accurately machined and threaded. These features cut your assembly time and cost.

COLD ROLLED THREADING ADDS STRENGTH

The grain structure and flow of metal obtained through cold heading and roll threading increases the structural strength of Pheoll Fasteners. Cold working improves thread bearing surfaces, providing greater area of contact for firmer grip. Greater strength reduces possibility of shearing, and time lost in subsequent removal and re-tapping.

OUR INSPECTION IMPROVES YOUR PRODUCT APPEARANCE

Step by step Pheoll inspection, through every process of production, assures uniform head size and shape; cleanly milled and recessed heads, neat chamfering and countersinking. All these factors contribute to the quality and finish which add materially to your product's final appearance. Write for Pheoll's product literature and price list.

**THERE PHEOLL PRODUCTS INCREASE
YOUR PRODUCTION RATE**

Thumb Screws • Wood Screws • Sheet Metal Screws • Stove Bolts • Rolled Threaded Wires and Studs • Special Rivets and Pins • Brass Washers

†Furnished in slotted
and Phillips Recessed Head Types

PHEOLL
MANUFACTURING COMPANY
5700 Roosevelt Road, Chicago 30, Ill.



You can replace
seamless tubing



or pipe with our



ROLLED STEEL SPACER

TUBES OR BUSHINGS



and save money in



machining • material • labor



PROMPT DELIVERY

FEDERAL-MOGUL



Since 1899

Products of our six plants include: Sleeve bearings in all designs and sizes; cast bronze bushings; rolled split-type bushings; bi-metal rolled bushings; washers; spacer tubes; precision bronze parts and bronze bars.



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AUTOMOTIVE INDUSTRIES, December 15, 1952

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BRAZING FURNACES

—Gas Fired
or Electric—

CUT MATERIAL, TOOLING AND FINISHING COSTS

For instance, brazing a disc on the end of a tube may use 75 to 80% LESS material than if the hollow flanged part is cut from the solid. Finishing costs are low too, because the assemblies are discharged smooth and scale-free.

Brazing also avoids localized overheating, distortion and the cost of straightening. It's ideal for most any size, shape or quantity requirement.

A fully descriptive brazing folder, including many suggested "do's" and "don'ts", sent on request. Write today!

THE ELECTRIC FURNACE CO.

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES
FOR ANY PROCESS, PRODUCT OR PRODUCTION

Salem - Ohio

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Power to Fit the Job

Power to Fit the Machine

**WISCONSIN-
Powered
General  Electric Welder**

Keeping snow removal equipment on the job often calls for on-the-spot repairs, handled here by a General Electric trailer-mounted WD-4200 welder. Power is provided by a V-type 4-cylinder Wisconsin Heavy-Duty Air-Cooled Engine.

Engineering know-how and practical design of Wisconsin Engines make their choice a logical one for manufacturers building 3 to 30 horsepower equipment. Only Wisconsin Engines offer a choice of 11 different single-cylinder, 2-cylinder and V-type 4-cylinder models, 3 to 30 hp. Only Wisconsin Engines offer tapered roller bearings at both ends of the crankshaft, taking up all thrusts. In addition, Wisconsin Engines offer an OUTSIDE magnet with impulse coupling for quick starts, steady running. And, of course, fool-proof air-cooling eliminates cooling problems.

Write today for complete information about all models.

*Powered by V-type
4-cylinder Wisconsin
Engine.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

Industry News

(Continued from page 23)

Lockheed Transport Flies with Turbo-Compound Engines

The Super Constellation, powered with four Wright turbo-compound engines, entered an intensive test program last month following its successful maiden flight, Lockheed Aircraft Corp. officials reported.

The new transport, compared with the first Constellation, is 18.4 ft longer (total 113 ft 7 in.) and has a maximum takeoff weight of 130,000 lb instead of 72,000 lb. It was designed to cruise with full payload at 340 mph or more, with a maximum approaching 400 mph at lighter weights.

The first turbo-compound Super Constellation in the air was a Navy version, the R7V-1, capable of carrying 106 passengers and four-man crew. With removable seats, it can be changed to carry cargo or serve as an ambulance plane. As a luxury air transport the plane can accommodate 59 passengers, or be converted to seat 99 tourist passengers. Delivery will start to the Navy within a few weeks. Delivery to 12 airlines will begin next year.

Wright Trophy Awarded

The National Aeronautic Association announced the award of the 1952 Wright Brothers Memorial Trophy to Lt. Gen. James H. Doolittle, (ret.) now a vice-president of Shell Oil Co. Formal presentation of the trophy will be made at the Wright Memorial Day Dinner at Washington, D. C., on Dec. 17.

The Wright Trophy, which has been awarded annually since 1948, is presented to an American citizen each year for "significant public service of enduring value to aviation," such service being in a civilian capacity. It is awarded for service over a period of years rather than for achievement in a specific year. Gen. Doolittle is chairman of a national committee to observe the 50th anniversary of flight, a year-long celebration which will begin with the Wright dinner.

Movie on Diesel Engine

"The Diesel Story," a new film giving a graphic account of the development and uses of the diesel engine, is now available for free showings, Shell Oil Co. announced. The motion picture is on 16 mm sound film and runs 20 minutes.

are you still running nuts one-at-a-time?



For years multiple drilling, tapping and reaming have saved time and dollars. . . . Now you can tool for increased savings with Ingersoll-Rand *Multiple Nut Runners*.



MULTIPLE NUT RUNNERS GIVE YOU:

- 2 or more nuts driven at once . . . in the time formerly required to drive one.
- Good "quality control." . . . Torque is uniform on each and every nut.
- Safe Operation for operator. . . . Torque reaction is non-existent.
- Immediate on-the-job operation. . . . No special training needed for the operator.
- Low Maintenance. . . . Units in service show maintenance savings up to 50%.

All Ingersoll-Rand *Multiple Nut Runners* are built to your specifications. Our power-tool application engineers will gladly go over your nut running jobs with you and make their recommendations—there's no obligation on your part. Send for Bulletin 5099.

**Ingersoll-Rand
Multiple Nut Runners
have increased output
70% over single power
wrenches.***

*Here's Nut Running History in the making!

The times below from the records of a leading car manufacturer are based upon 1000 units of comparable nut running operations.

| | |
|-------------------------------|--------------|
| 1912....Hand Wrench | 200 Man Hrs. |
| 1917....Speeder Wrench | 100 Man Hrs. |
| 1928....Single Power Wrench.. | 50 Man Hrs. |
| 1952....Multiple Nut Runner.. | 14 Man Hrs. |



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TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS
DIESEL AND GAS ENGINES

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... or Released in an Instant



CRUNCH TYPE



INSTRUMENT MOUNTING



SPRING TYPE



THIN TYPE



STANDARD

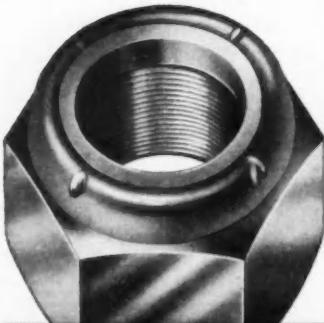
Faster assembly . . . no more failures of fasteners. GREER STOP NUTS hold firm against jolts, shocks, shimmy, wobbles . . . any vibration, any kind.

Bolt threads are gripped tightly . . . these famous nuts never work loose. Yet an ordinary hand wrench gives instant release. The tough, built-in GREERCOID collar does it . . . and seals against fluid leakage, too!

Study your fastener problem. Over 3000 types and sizes. Consult GREER. Proved on thousands of products. Meets gov't and military specifications.

Write

GREER STOP NUT CO.
2620 Flournoy, Chicago 12, Ill.



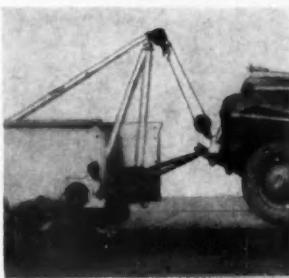
GREER Stop Nuts

NEW PRODUCTS.

For additional information please use postage-free reply card on page 65

(Continued from page 94)

Electric Power Drive for Cranes

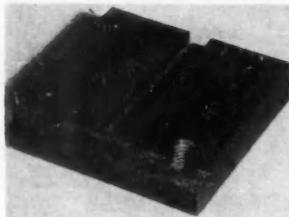


Now available is the PD-3 electric power drive connected to its push-button control box by a long, flexible cable. Installation of the PD-3 on the WC-3 or WCJ-3 hand-operated wrecking cranes is said to convert them from hand to electric operation.

With the PD-3, the operator reportedly can raise, lower, or hold the load merely by pressing a button. Power is supplied by truck battery or any other six-v battery. *Manley Div., American Chain & Cable Co.*

Circle P-10 on page 65 for more data

Fibrous Insulation Sheet Material



Two grades of a heavy-gage fibrous insulating sheet material, said to be comparable in strength to fabric-base materials, have been announced.

Known as Duroids 700 and 800, the materials can be drilled, tapped, machined, or sawed, using conventional equipment. Thicknesses up to three in. are available. *Rogers Corp.*

Circle P-11 on page 65 for more data

Infra-Red Drying Ovens and Panels

Recently added to a line of paint drying equipment are two sizes of infra-red baking panels and three ovens in a range of sizes to handle complete cars and small trucks.

The ovens are said to employ the same principles as found in paint drying units used in automobile manufacturing plants. They may be used inside spray booths to bake finishes

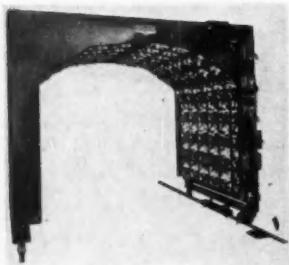
without moving cars anywhere else.

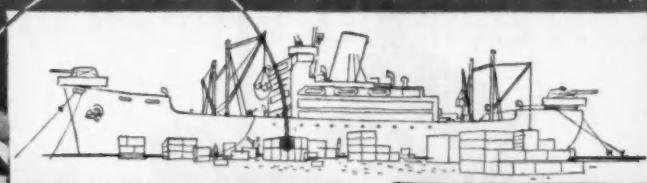
The units are automatic and come equipped with an electrically coupled timer and speed control mechanism to eliminate hazards of over-baking. In addition, selective switches reportedly control individual lamp zones, so that just one side or the top area of a car can be baked without using the entire unit.

The ovens can handle vehicles up to nine ft in height and seven ft, eight in. wide. Its own dimensions for the largest size are: six ft, one in. long; nine ft, six in. wide; and 10 ft, two in. high. The smallest model is four ft, three in. long; seven ft, five in. high, and nine ft, six in. wide.

The baking panels for spot painting jobs are 48 by 48 in. or 70 by 92 in. in size. These radiant panels will dry a complete car paint job when used in pairs. *The DeVilbiss Co.*

Circle P-12 on page 65 for more data





ready for action...FAST

because it's protected by

ALCOA FOIL

Degreasing small arms used to be a mean chore. Now, a newly developed pouch puts this "45" in the soldier's hands... *ready for instant action*.

From a protective standpoint, this pouch more than matches the effectiveness of former greasing methods. Much of its success is due to its sparkling liner of aluminum foil. Laminated to other barrier materials, foil blocks the destructive inroads of dust, dirt and moisture.

Alcoa, and its customers—the nation's leading packaging firms—are continually developing new ways to package many products better... in foil and foil laminates. For full information on possible applications and capabilities, just call your local Alcoa sales office, listed under "Aluminum" in your classified phone directory, or write: ALUMINUM COMPANY OF AMERICA, 1764 M. Gulf Building, Pittsburgh 19, Pennsylvania.



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every Sunday... brings the world to your armchair.
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Pouch shown made from Diblockous Materials by
Kelllogg Container Div., United States Envelope Co.





*Our Engine Bearings
are specified as
original equipment
by the leading
names in motordom
because they have
consistently
contributed to better
performance
for more than a
quarter century.*



DETROIT ALUMINUM & BRASS CORPORATION
DETROIT 11, MICHIGAN

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INTERNATIONAL

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CASE

HERCULES

If you **SPECIFY** or **BUY** Air Cleaners....

Engine analysis determines the requirements of your engine and its installation.



DONALDSON

"Follow-through" SERVICE!

It's a multiple-service package, included with every order for Donaldson Air Cleaners. This service starts in your engineering department when dust protection requirements for your engine are outlined, and continues throughout the life of the product, assuring you and the user of dependable protection against dust.

Donaldson Air Cleaners are custom-designed to fit your particular engine and the unit for which it is the prime mover. Intensive tests in the laboratory and in the field assure you of high dust removal efficiency under all conditions.

Location counsel is another important service, recommending placement of the air cleaner and its intake after considering areas of minimum dust, operator's vision and pleasing overall design.

Finally, Donaldson "follow-through" service includes working out packaging and materials-handling problems for low-cost handling in your plant or warehouse.

What is your air cleaner problem?
Write our engineering department.

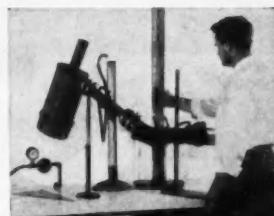
DONALDSON COMPANY, INC.

666 Pelham Blvd., St. Paul 14, Minnesota

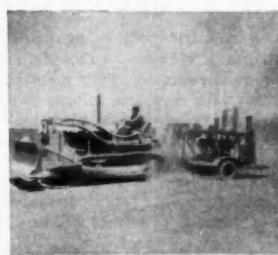
Grinnell Division: Grinnell, Iowa
Donaldson Company (Canada) Ltd., Chatham, Ontario



DESIGN — Donaldson engineers design the air cleaner to fit your engine.



LABORATORY TESTING — Here the air cleaner is tested for efficiency under all operating conditions.



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DONALDSON FIELD SERVICE
makes sure that your equipment stays properly protected against dust.

Donaldson AIR CLEANERS



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SLEEVE
BEARINGS**



JOHNSON BRONZE engineering is far more than designing bearing types and shapes. It is based on thorough studies of your product, its service requirements and your methods of assembly. Johnson engineers start with complete information—load, speed, shock, operating temperatures, lubrication, corrosive conditions and other data. Design is often affected by installation and mounting methods. After this study they may recommend one of several types of sleeve bearings and the correct bearing alloy for your use. And they will design the bearing to your requirements, working closely with your engineers. If this kind of service will be valuable to you, write, wire or call for an appointment.

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SLEEVE BEARING HEADQUARTERS SINCE 1901

JOHNSON  **BEARINGS**
Sleeve-J Type

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—copper alloy

STEEL BACK

—babbitt lined

BRONZE BACK

—babbitt lined

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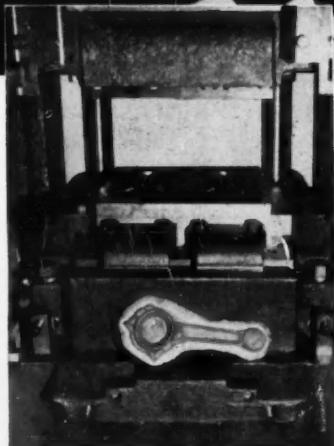
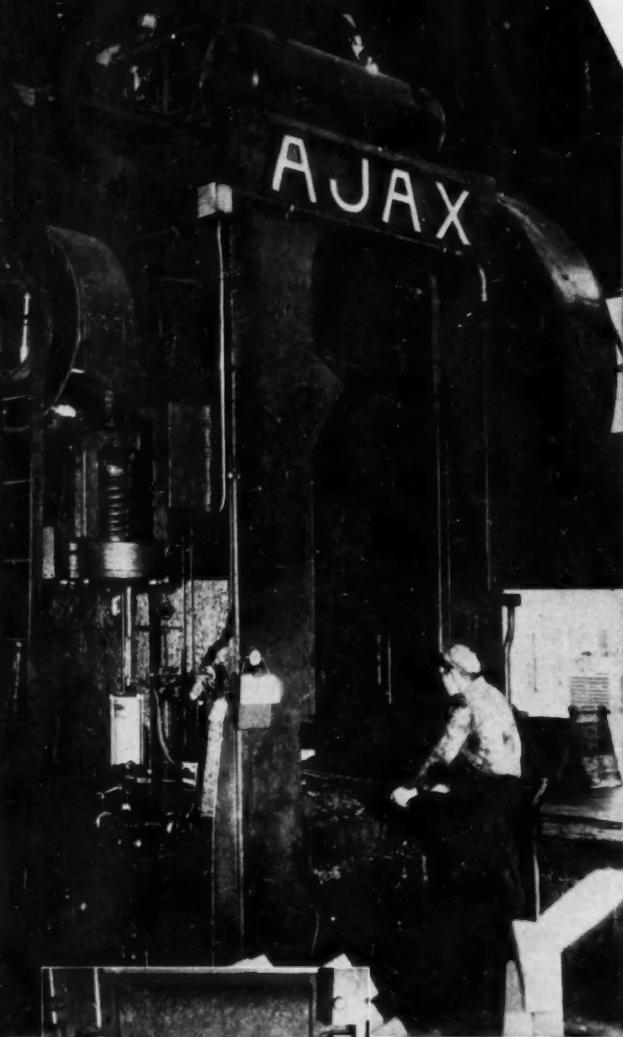
ALUMINUM ALLOY

—LEDALOYL

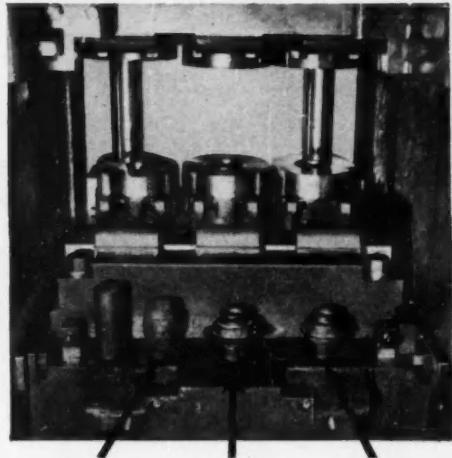
—powder metallurgy

FORGED IN

AJAX PRESSES



Shown here are the dies and bolsters mounted in a 1600 ton press. The product, a heavy automotive connecting rod, is pictured in the foreground.



The progressive forging operations necessary for forming gear blanks for heavy trucks are shown in the foreground. Above, the dies mounted in a 1600 ton press, are in the following order: buster die on the left, blocker die on right and the finish forge die in the center. Each operation is shown in front of the die it is formed in.

WRITE FOR BULLETIN 75 B

THE
Ajax

MANUFACTURING
COMPANY

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We have prepared a 20-page booklet that graphically and concisely presents the complete story. A copy is yours for the asking.

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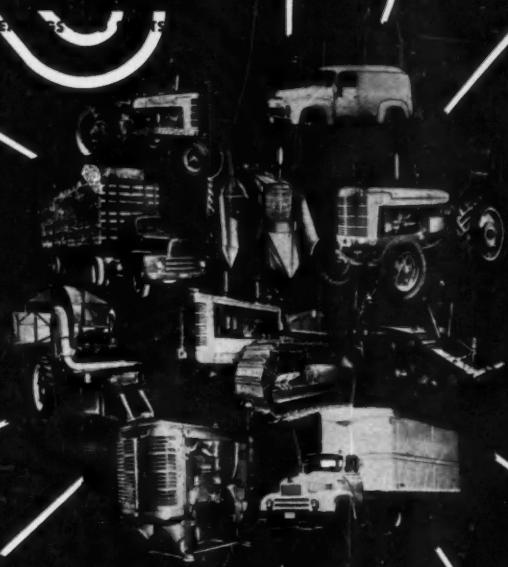
There Is Plenty of Tin in Malaya



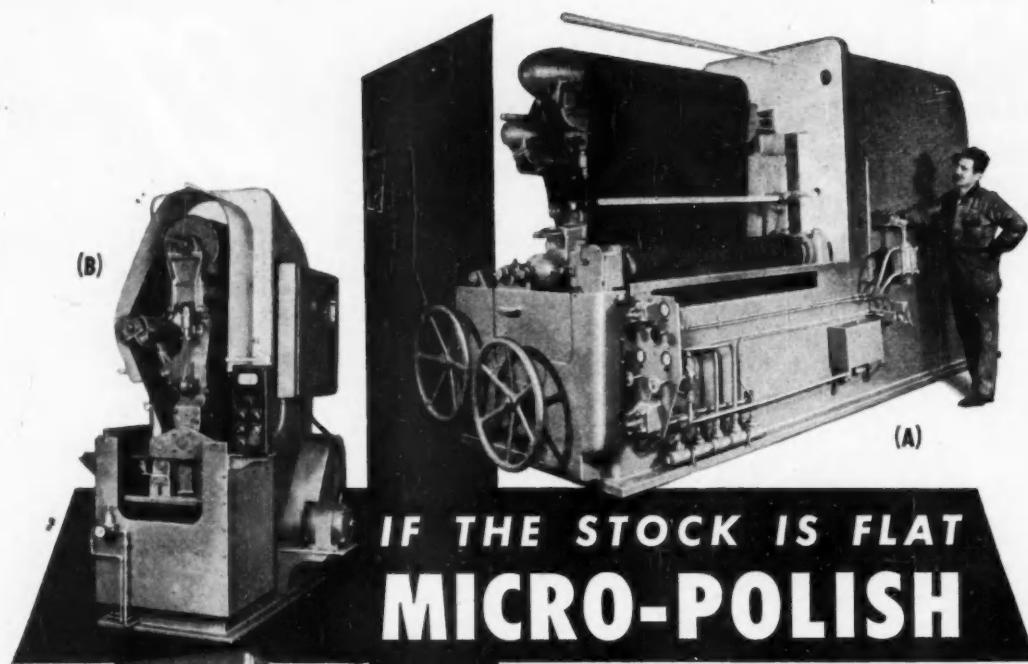


Aetna

27



Aetna



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can automatically finish your job faster, better or cheaper regardless of size, shape or material.

Murray-Way, "engineered-to-the-job", Micro-Polish equipment is now being used the country over in every type of application, on every conceivable kind of material.

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A Micro-Polish giant used in reclamation grinding of steel strip.

One of our smaller units used in polishing narrow bi-metal stock.

C A versatile unit using belt conveyor to polish a variety of flat stampings and forgings.

D A space saver unit for polishing flat bar stock. Two heads and two grades of belt grain accomplish the complete job without rehandling.

Murray-Way engineers will gladly show you how this time and cost saving method can improve your polishing operation.



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POST OFFICE BOX 180 - BIRMINGHAM, MICHIGAN

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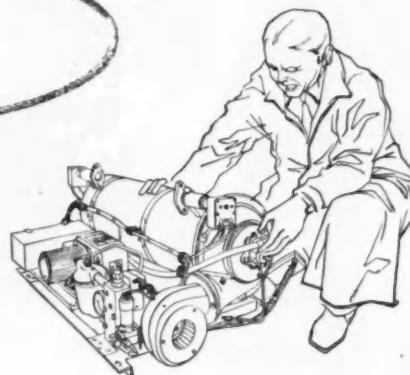
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Then there is the human side. Coaches without passengers are never profitable, so passenger and operator comfort is another dividend that Janitrol capacity and dependability will always guarantee.

Proof that Janitrol equipment does pay dividends is evident in our steadily rising sales chart. And it's not a flash trend either, but one that has grown consistently with motor coach production over the last eight years. Before you invest in coach heating equipment, better put dividend insurance on your investment by specifying Janitrol. Write for technical bulletins and operating case histories now. Or, if you want immediate assistance, get in touch with your nearest Janitrol representative.

HEAT WHEREVER YOU WANT IT



Janitrol

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One complete piece.....

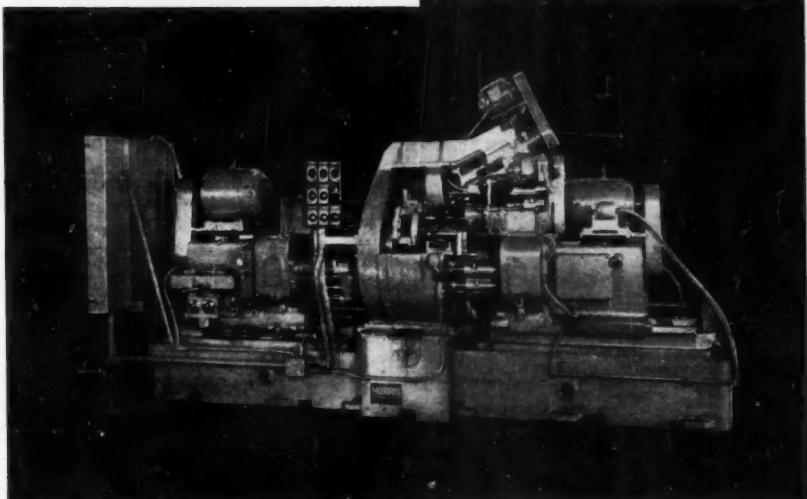
29 Operations Every 41 Seconds.....

Producing crankshaft main bearing caps, this MORRIS Two Way, 6-Station Machine performs 29 operations with a single loading. One head carries 14 spindles, the other 12 spindles. Production rating is 87 pieces per hour at 100% efficiency. Operations performed include drilling, reaming, spot-facing and tapping.

This Morris application, for a leading automotive manufacturer, illustrates that "two heads are better than one" for higher production at lower cost. Put your heads together with MORRIS Engineers on any mass production, multiple drilling, reaming, tapping and similar operations. You'll save time, money, labor and floor space.

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Morris

THE MORRIS MACHINE TOOL COMPANY
938 HARRIET ST. CINCINNATI 3, OHIO

Tooling or Re-tooling?

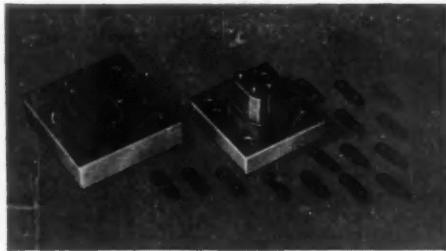
L&N FURNACES HELP TOOLS PRODUCE MORE

• Shown here are the tools and dies of some of the literally hundreds of firms that have found how to cut tool costs with Vapocarb-Hump Hardening and Homo Tempering Furnaces.

Butcher & Hart Co., Toledo, for instance, gets the uniform heating it needs to avoid distortion of the recessed head of cold-heading dies like the one shown.

The special gears of Sonoco Products Co., Hartsville, S.C., are heated with the uniformity needed to preserve their firm, true-running fit.

Towle silverware dies leave the Homocarb furnace with never a particle of scale in their intricately carved detail—need none of the stoning and other time-consuming hand finishing that would be required if scale had developed.

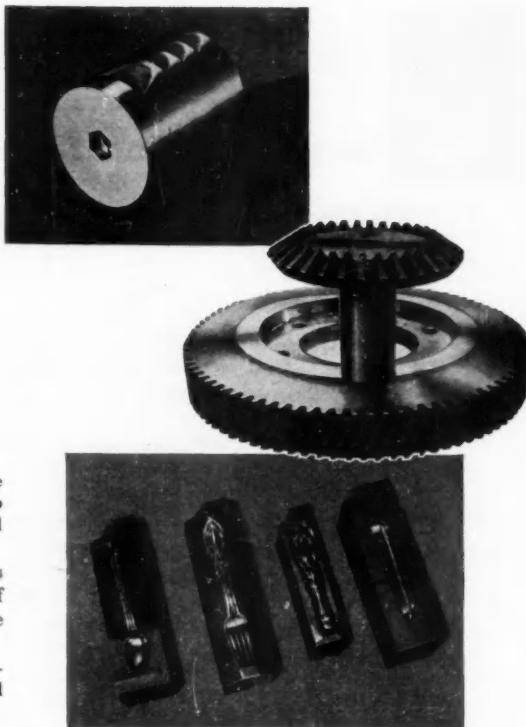


Heat-Treating Costs Least, Adds Most to Tool Life

A cost analysis of the simple punch and die set shown above gives a picture of the relative costs of tool-making and of heat-treating, in producing a complete tool.

The toolmakers who shaped and assembled the punch and die used machine tools worth \$31,000, beginning with the cutting off of the steel and ending with the final filing. And, the tool-making time was 21 man-hours.

The heat-treater, on the other hand, used Vapocarb-Hump Hardening and Homo Tool Tempering equipment costing, complete with controls, only \$5,500; and he did both jobs in 3 hours.



In other words, heat-treating represents only one-sixth of the total tool cost, yet it is largely responsible for the future performance of the tools. This is a typical example of the familiar fact that it pays to give the heat-treater precision equipment in both furnaces and controls. Whether you're tooling or re-tooling, the heat-treat's comparatively small cost can make a big difference in tool life.

A letter or call to our nearest office, or to 4966 Stenton Ave., Phila. 44, Penna., will bring complete catalog information or put you in touch with an experienced heat-treat engineer, as you wish.

CAREER OPPORTUNITIES AT L&N

Expansion program of this long-established firm has many features to attract outstanding recent graduates in engineering and science. Opportunities are in sales field engineering, product and application engineering, research, advertising, market development. Widely-respected policies assure recognition of progress and achievement. Address Personnel Manager for preliminary interview at nearest of 17 L&N offices.

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Save time and money with Black & Decker Tools . . . sold through leading distributors everywhere! These world-famous tools give you dependable, full-powered motors . . . perfect balance and streamlined design . . . tough, longer-wearing parts for years of top-notch service!

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Just out . . . 32 well-illustrated pages, containing data on all Carmet grades, and on Carmet blanks, tools, die sections, punches, draw die inserts, etc.; also special preforming to order. • Write for your copy.

ADDRESS DEPT. AI-36

When the exact shape and size of Tip you need is not to be found in carbide producers' catalogs, what should you do?—(1) order the Tips that seem to be adaptable, and then go to the expense of grinding them down to suit—or (2) ask CARMET to build you a die that presses the Tips to *your* designs? The answer is obvious! Save costly grinding.

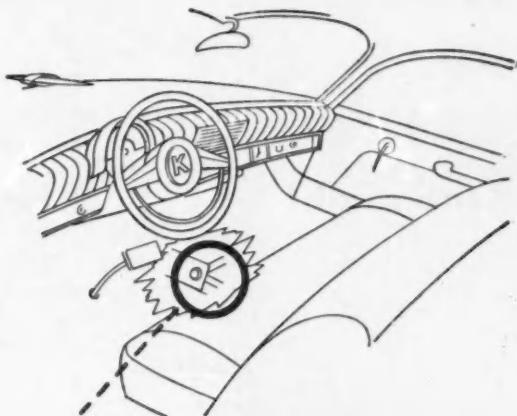
Each one of the designs pictured above was pressed or preformed by us in quantity to the specific requirements of some individual customer. No excess metal remained for costly removal.

For suggestions, call or write your nearest A-L representative today. • *Allegheny Ludlum Steel Corporation, Carmet Div., Wanda & Jarvis Aves., Detroit 20, Mich.*

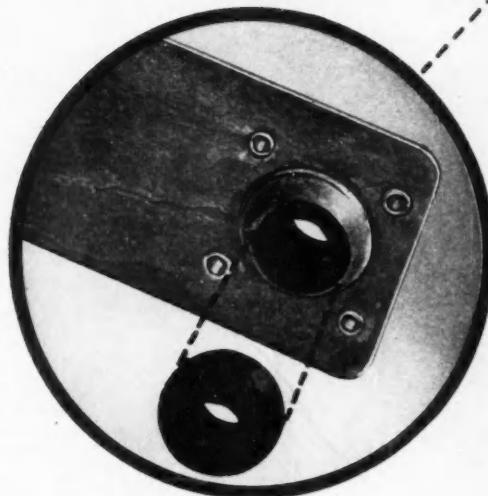
For complete MODERN Tooling, call
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WAD 3980





Du Pont nylon cuts noise in Kaiser clutch assembly



Bearing molded by
The Danielson Mfg. Co., Danielson, Conn.,
for Kaiser-Frazer Corp.,
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*Nylon bearing needs no
lubrication . . . eliminates
electrolytic corrosion*

In designing their 1952 models, Kaiser engineers sought a material for the clutch cross-shaft bearing that would eliminate noise. But all the materials tested had the same faults. They were noisy, had to be oiled and wore quickly because of electrolytic action.

The answer was a bearing molded of Du Pont nylon. According to K-F, nylon was selected "because of the ability of the nylon bearing to operate without lubrication and the absence of electrolytic corrosion." Noise has been eliminated. And nylon's abrasion resistance and unique bearing characteristics have resulted in improved clutch performance.

Du Pont nylon is unaffected by gasoline, oil and grease . . . operates at temperatures up to 250°F. Nylon parts can be economically mass-produced to close tolerances by rapid injection-molding.

The outstanding advantages of Du Pont nylon are improving performance and cutting costs in a number of automotive parts, such as clutch and brake bumper seals, windshield wiper gears, and lamp lenses. Its properties may well be of value to you. For full information, write:

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Polychemicals Department; District Offices:
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7 S. Dearborn Street, Chicago 3, Ill.
845 E. 60th Street, Los Angeles 1, Calif.



"she might have been my kid..."

There was no time to stop, see? She comes running out from behind this parked car right under my wheels. Her hair is in pig-tails, and with the sun shining on it, she might have been *my* kid. We got her to the hospital. It took 3 pints of blood to bring her around. All I have to do is remember the sound of those screaming tires—and I know

why *I'm* giving blood."

Yes, all kinds of people give blood—truck drivers, office workers, salesmen. And—for all kinds of reasons. But whatever *your* reason, this you can be sure of: Whether your blood goes to a local hospital, a combat area or for Civil Defense needs—this priceless, painless gift will some day save an American life!

Business Executives!

✓Check These Questions!

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- Have you given your employees time off to make blood donations?
- Has your company given any recognition to donors?
- Do you have a Blood Donor Honor Roll in your company?
- Have you arranged to have a Bloodmobile make regular visits?
- Has your management endorsed the local Blood Donor Program?
- Have you informed your employees of your company's plan of co-operation?
- Was this information given through Plant Bulletin or House Magazine?
- Have you conducted a Donor Pledge Campaign in your company?
- Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?

Remember, as long as a *single* pint of blood may mean the difference between life and death for *any* American . . . the need for blood is *urgent*!

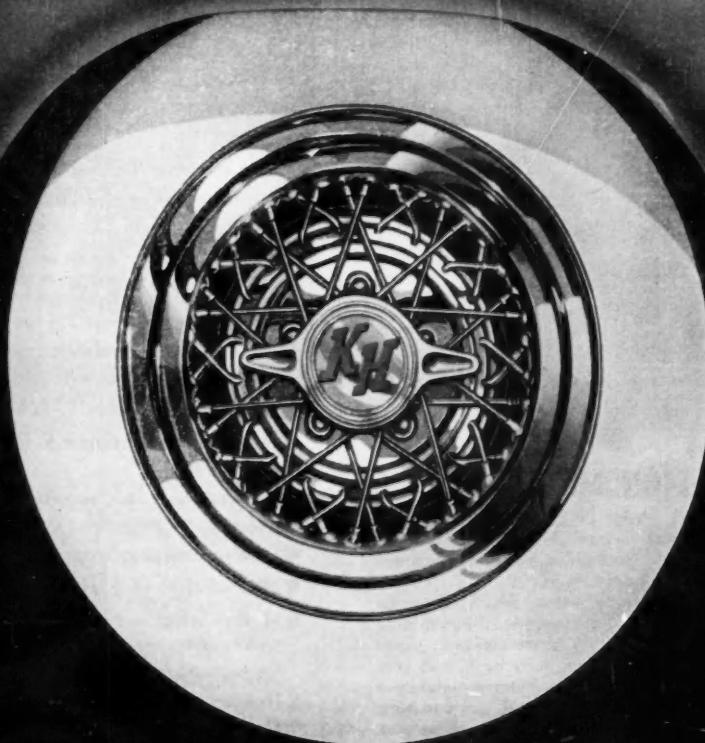
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NATIONAL BLOOD PROGRAM



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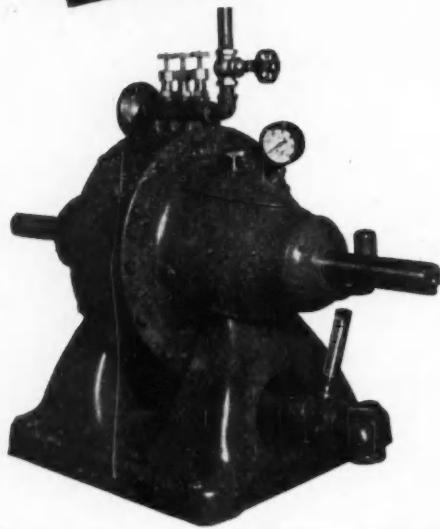
DETROIT 32, MICHIGAN

PRODUCTS: Wheels—Hub and Drum Assemblies—Brakes—Vacuum Brake Power Units—for Passenger Cars, Trucks, Buses—Electric Brakes for House Trailers and Light Commercial Trailers—Wheels, Hubs, Axles, Parts for Farm Implements
PLANTS: Kelsey-Hayes Plants in Michigan (4), McKeesport, Pa., Los Angeles, Calif., Davenport, Iowa, Windsor, Ontario, Canada



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Taylor engineers will be glad to make recommendations to suit your specific problems. Write for Bulletin No. 760.

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- ¶ How to clean aluminum before and after heat treating? *See page 20.*
- ¶ How to strip paint from aluminum? *See page 22.*
- ¶ How to clean magnesium? *See page 27.*
- ¶ How to select and install cleaning tanks, rinse tanks and sprays, and spray-washing machines? *See pages 31 to 35.*
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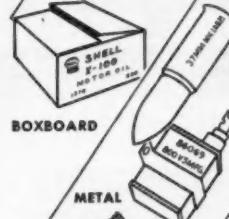
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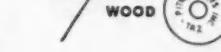
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De-Sta-Co Toggle Clamps maintain efficient production of Fairchild C-119 "Flying Boxcars" at Kaiser-Frazer. KF engineers welded a small contact bar to the clamps and taped them to protect the skin surfaces of the main canopy. Model No. 210-S Toggle Clamps used on this welded fixture also provide precise alignment of the glass retainer of the canopy structure during the riveting operation. Rapid toggle action and ease of work removal make De-Sta-Co Clamps the logical choice for this production application.

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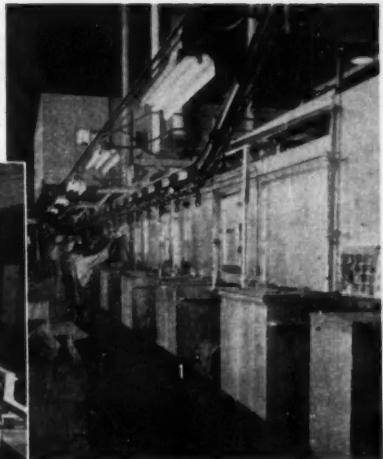
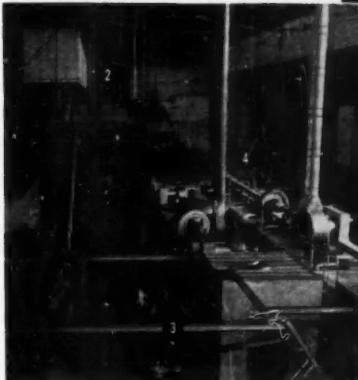
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This could well be your statement too, if you could reduce your payroll from 50 to 35 men, yet produce more with improved quality of finish. Comparable savings and increased production can be made in your plant with a Burdett System engineered to your requirements. There are no obligations for Burdett recommendations — write.

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- 3 Dry-Off Oven, after wash — Burdett Radiant Heat System — Cycle 3 min. 350° F.
- 4 4-Stage Spray Washer.



Photos courtesy
D. W. Onan & Sons
Minneapolis

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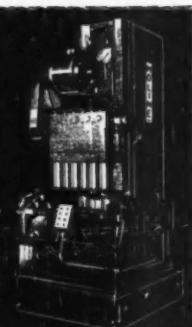
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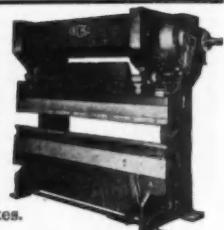


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Index to

| | |
|---|---|
| A | |
| AC Spark Plug Div. | Black & Decker Mfg. Co. 177 |
| Acadia Div., Western Felt Works 10 | Blakeslee & Co., G. S. |
| Accurate Bushing Co. | Bliss Co., E. W. |
| Ace Drill Bushing Co., Inc. | Blood Bros. Machine Co. |
| Ace Plastic Co. 156 | Bodine Corporation, The |
| AcuShnet Process Company | Borg & Beck Div. 112 |
| Aeroquip Corporation | Borg-Warner Corp. |
| Aetna Ball & Roller Bearing Co. 171 | Brainard Steel Div. 13 |
| Air-O-Matic Power Steer Corp. | Brantl, Inc., Chas. T. |
| Ajax Manufacturing Co., The 169 | Brown Corp., The. 142 |
| Allegheny-Ludlum Steel Corp. | Brush Development Co. |
| Allen Mfg. Co. 178 | Buckeye Tool Co. 134 |
| Allied Products Corp. | Builders Steel Supply Co. 186 |
| Allison Division GM. | Bullard Company, The. |
| Allmetal Screw Products Co., Inc. | 157-158 |
| Aluminum Co. of Amer. 165-183 | Bulldog Electric Products Co. |
| Aluminum Industries, Inc. | Bundy Tubing Company. |
| American Bosch Corp. | 118-119 |
| American Brakebuk Div. 131 | Bunell Machine & Tool Co. |
| American Broach & Machine Co. | Burdett Mfg. Co. 185 |
| American Chain & Cable Co. | |
| American Chemical Paint Co. 100 | C |
| American Hard Rubber Co. | C.A.V. Division of Lucas Electrical Services, Inc. |
| American Pullmax Co., Inc. | Camcar Screw & Mfg. Corp. 82 |
| American Red Cross. 180 | Campbell, Wyant & Cannon Foundry Co. 117 |
| American Steel Foundries | Carbology Dept. of General Electric Co. |
| Armstrong Cork Co. 26-78 | Chambersburg Engineering Co. |
| Associated Spring Corp. 28 | Chefford Master Mfg. Co. |
| Automatic Spring Coiling Co. | Chicago Rawhide Mfg. Co. 154 |
| Automotive Gear Works | Chicago Rivet & Machine Co. 106 |
| Avco Mfg. Corp. | Chicago Screw Co., The. 141 |
| B | |
| Babcock & Wilcox Co., Tubular Products Div. | Chiksan Co. |
| Baird Machine Co., The | Cincinnati Cleaning & Finishing Machinery Co. 159 |
| Baldwin-Lima-Hamilton Corp. | Clark Bros. Co. |
| Barber-Colman Co. | Clark Equipment Co. 94-121-122 |
| Barnes Co., Wallace. 28 | Clearing Machine Corp. 101 |
| Barnes, W. F., & John. | Cleveland Container Co. 108 |
| Barnes-Gibson-Raymond Bath Company, Cyril. | Cleveland Metal Abrasive Co. |
| Bendix Aviation Corporation | Cleveland Punch & Shear Wks. Co., The. |
| Bendix Products Div. 14 | Climax Molybdenum Co. |
| Eclipse Machine Div. | Clinton Machine Co. |
| Radio Div. | Metalmaster Div. |
| Scintilla Magneto Div. | Columbia-Geneva Steel Div. 115 |
| Stromberg-Elmira Div. | Cone Automatic Machine Co., Inc. 12 |
| Zenith Carburetor Div. | Connecticut Hard Rubber Co. |
| Bendix-Westinghouse Automotive Air Brake Co. | Continental-Diamond Fibre Co. 153 |
| Bethlehem Steel Co. | Continental Motors Corp. |
| Binks Mfg. Co. 144 | Continental Screw Co. |
| | Continental Tool Works Div. |
| | Coolidge Corp. |
| | Cotta Transmission Co. |
| | Crescent Co., Inc. |
| | Cross Company, The. |
| D | |
| | Danly Machine Specialties, Inc. |
| | Davis & Thompson Co. |
| | Delco Products Div. G.M. |
| | Detroit Aluminum & Brass Corp. 166 |
| | Detroit Stamping Co. 184 |
| | Detroit Steel Products Co. |
| | Do-All Co., The. |
| | Dole Valve Co., The. 146 |
| | Donaldson Co., Inc. 167 |
| | Dow Chemical Co. |
| | Dow Corning Corp. 63 |
| | Dreis & Krump Mfg. Co. 186 |
| | Dunmore Co. 130 |
| | Dunbar Brothers Co. 28 |
| | du Pont de Nemours & Co., Inc., E. I. 110-111-179 |
| | Dykem Co. |
| E | |
| | Eaton Manufacturing Co. 81-99-113 |
| | Elastic Stop Nut Corp. 27 |
| | Elico Tool & Screw Corp. |
| | Electric Auto-Lite Co., The. |
| | Electric Furnace Co., The. 162 |
| | Electric Products Co. |
| | Electric Storage Battery Co. |
| | Elmes Engineering Div. |
| | Evans Products Co. 126 |
| | Ex-Cell-O Corp. |
| | Excelsior Leather Washer Mfg. Co. |
| F | |
| | Fairchild Engine & Airplane Corp. 184 |
| | Fairfield Mfg. Co. 155 |
| | Farquhar Co., A. B. 105 |
| | Fasco Industries, Inc. |
| | Federal-Mogul Corp. 161 |
| | Federal Products Corp. |
| | Fellows Gear Shaper Co., The. 186 |
| | Fitzgerald Mfg. Co., The. |
| | Foote-Burt Company, The. 30 |
| | Fram Corp. |
| | Frenchtown Porcelain Co. |
| | Frontier Bronze Corp. |
| | Fuller Manufacturing Co. 91 |
| G | |
| | G & O Mfg. Co., The. |
| | Galand-Henning Mfg. Co. 152 |
| | Garrett Co., Inc., Geo. K. |
| | Gas Appliance Service, Inc. 92 |
| | General Electric Company. |
| | Gibson Co., Wm. D. 28 |
| H | |
| | Gisholt Machine Co. 75 |
| | Gitz Bros. Mfg. Co. |
| | Globe-Union, Inc. |
| | Goodrich Chemical Co., B. F. |
| | Gottschal, Inc., Adolf. 136 |
| | Great Lakes Steel Corp. 95 |
| | Greenlee Bros. & Co. |
| | Greer Hydraulics, Inc. 125 |
| | Greer Stop Nut Co. 164 |
| | Gunite Foundries Corp. |
| I | |
| | Illinois Tool Works. 135 |
| | Indiana Gear Works. |
| | Industrial Filter & Pump Mfg. Co. |
| | Industrial Filtration Co. |
| | Ingersoll-Rand. 163 |
| | Inland Manufacturing Div. |
| | Inland Steel Company. 59 |
| | International Nickel Co., Inc. 2 |
| J | |
| | Janitrol Div. Surface Combustion Corp. 174 |
| | Johnson Bronze Co. 168 |
| | Johnson Products, Inc. 88 |
| | Jones Motorola Corp. |
| K | |
| | Kelsey-Hayes Wheel Co. 181 |
| | Kennedy Car Liner & Bag Co., Inc. |
| | Kent-Owens Machine Co. |
| | King-Seeley Corporation |
| | Kingsbury Machine Tool Corp. |
| | Kold-Hold Mfg. Co. 150 |
| | Korfund Co., Inc. 184 |
| | Kropp Forge Company. 93 |

Advertisers

and not as part of the advertising contract. Every
will be made for errors or failure to insert.

L

| | |
|--|-----|
| Lake Erie Engineering Corp. | — |
| Lamb Electric Company | 132 |
| La Pointe Machine Tool Co. | 89 |
| Lece-Neville Co., The | — |
| Leeds & Northrup Co. | 176 |
| Leland, Inc., G. H. | — |
| Le Roi Company | — |
| Libbey-Owens-Ford Glass Co. | — |
| Link-Belt Co. | 109 |
| Lipe-Rollway Corp. | — |
| Littell Machine Co., F. J. | — |
| Logan Engineering Co. | — |
| Long Manufacturing Div. | 26 |
| Lord Manufacturing Co. | — |
| Lorraine Mfg. Corp. | — |
| Lucas Machine Div. New Britain Machine Co. | — |
| Lycoming-Spencer Div. | — |
| Avco Mfg. Corp. | — |

National Steel Corpora-

| | |
|--|-------|
| National Steel Corpora- | — |
| National Tube Div. | 115 |
| New Britain Machine Co. (Gridley Machine Div.) | — |
| New Departure Div. | — |
| Niagara Machine & Tool Back Cover | — |
| Wks. | 96-97 |
| Norton Company | — |

O

| | |
|--------------------------|-----|
| O & S Bearing Co. | — |
| Oskite Products, Inc. | 182 |
| Ohio Crankshaft Co. | — |
| Ohio Division | 147 |
| Ohio Seamless Tube Co. | — |
| The | 173 |
| Orban Co., Inc., Kurt. | 116 |
| Osborn Manufacturing Co. | — |
| | 83 |

P

| | |
|---|-----|
| Page Steel & Wire Div., Amer. Chain & Cable Co., Inc. | — |
| Palmut Company, The | — |
| Pangborn Corp. | 4 |
| Parker Appliance Co. | — |
| Parker Rust Proof Co. | — |
| Perfect Circle Corp. | — |
| Perfection Stove Co. | — |
| Perma Products Co. | — |
| Pesco Products Div. | — |
| Borg-Warner Corp. | 127 |
| Peters-Dalton, Inc. | 80 |
| Pheell Manufacturing Co. | 160 |
| Phillips Manufacturing Company | — |
| Pierce Governor Co., Inc. | — |
| Pines Engineering Co., Inc. | — |
| Pittsburgh Plug & Products Co. | — |
| Pittsburgh Steel Co. (Thomas Strip Div.) | — |
| Plastic Research Products | — |
| Polyken Industrial Tapes Dept. of Bauer & Black | 5 |
| Potter & Johnston Co. | — |
| Pratt & Whitney Div., Niles-Bement-Pond Company | — |
| Purolator Products, Inc. | — |

N

| | |
|-------------------------------|----|
| N-A-X Alloy Division | 95 |
| National Acme Co., The | — |
| National Breach & Machine Co. | — |
| National Carbon Co. | — |
| National Machinery Co. | — |
| National Metal Edge Box Co. | — |
| National Motor Bearing Co. | 79 |
| National Screw & Mfg. Co. | — |

| | |
|--|----|
| Ramsey Corporation | — |
| Rathbone, Hair & Ridgway Box Co. | — |
| Raybestos-Manhattan, Inc. (Equipment Sales Div.) | — |
| Raymond Mfg. Co. | 28 |
| Remont Mfg. Co. | — |
| Republic Steel Corp. (Steel & Tubes Div.) | — |
| Revere Copper & Brass, Inc. | — |

R

| | |
|---|-----|
| Reynolds Metals Co. | — |
| Reynolds Wire Div. | — |
| Rezolin, Inc. | — |
| Richards Co., J. A. | 186 |
| Rinshed-Mason Company | — |
| Rockford Clutch Div. | 102 |
| Ross Gear & Tool Co. | 9 |
| Roto-Finish Co. | — |
| Russell, Burdsall & Ward Bolt & Nut Co. | — |
| Ryerson & Son, Inc., Joseph T. | 16 |

S

| | |
|--|---------|
| SKF Industries, Inc. | — |
| Saginaw Steering Gear Div. | — |
| Sahlins Engineering Co. | 138 |
| Schmieg Industries, Inc. | 87 |
| Schrader's Son, A. | — |
| Schwitzer-Cummins Co. | — |
| Sclaky Bros., Inc. | — |
| Sealed Power Corporation | 89 |
| Seamless Rubber Co. | 160 |
| Seneca Falls Machine Co. | — |
| Service Spring Co. | 186 |
| Shakeproof Div. | 135 |
| Sheffield Corp. | — |
| Shuler Axle Co., Inc. | — |
| Simmons Fastener Corp. | — |
| Simonds Abrasive Co. | — |
| Snyder Tool & Engineering Co. | 148-149 |
| Sorensen & Co., Inc. | — |
| Sperry Products, Inc. | — |
| Spicer Mfg. Div., Dana Corp. | 139-140 |
| Stalwart Rubber Co., The Standard Locknut & Lockwasher, Inc. | — |
| Standard Oil Co. (Ind.) | — |
| Standard Pressed Steel Co. | — |
| Standard Tube Company | — |
| Steel Products Engineering Co. | — |
| Sterling Aluminum Products, Inc. | 128-129 |
| Stewart-Warner Corp. | 133 |
| Strom Steel Ball Co. | — |
| Stuart Oil Co., Ltd., D. A. | — |
| Sturtevant Co., P. A. | 185 |
| Subscription Post-Card. | 20 |
| Sun Electric Corp. | — |
| Sun Oil Company | 6 |
| Sundstrand Machine Tool Co. | — |
| Superior Steel Corp. | 103 |
| Surface Combustion Corp. | 174 |
| Synchro-Start Products, Inc. | 73 |

T

| | |
|--------------------------------------|-----------|
| Taylor Dynamometer & Machine Co. | 182 |
| Teleflex, Inc. | — |
| Tennessee Coal & Iron Div. | — |
| Tennessen Engineering, Inc. | — |
| Texas Company, The | — |
| Thompson-Bremer & Co. | 3rd Cover |
| Thompson Products, Inc. | 29-71 |
| Timken Detroit Axle Co. (Brake Div.) | — |
| Timken Roller Bearing Co., The | 24 |

Y

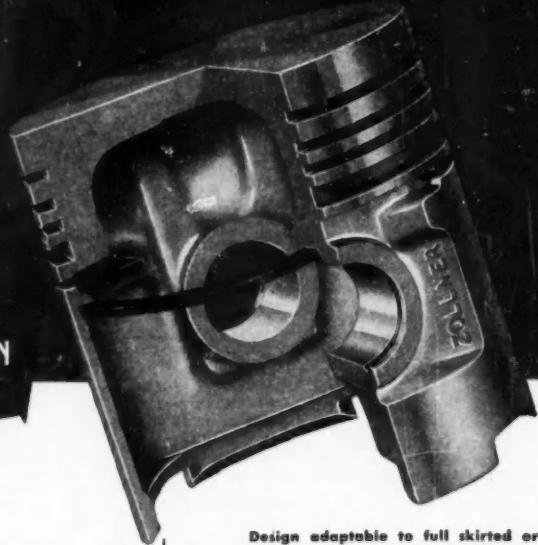
| | |
|----------------------------------|-----|
| Yale & Towne Mfg. Co., The | 87 |
| Yates-American Machine Co. | — |
| Young Radiator Company | — |
| Young Spring & Wire Corp., L. A. | 137 |

Z

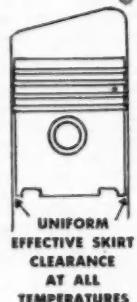
| | |
|-------------------------|-----|
| Zollner Machine Works.. | 190 |
|-------------------------|-----|

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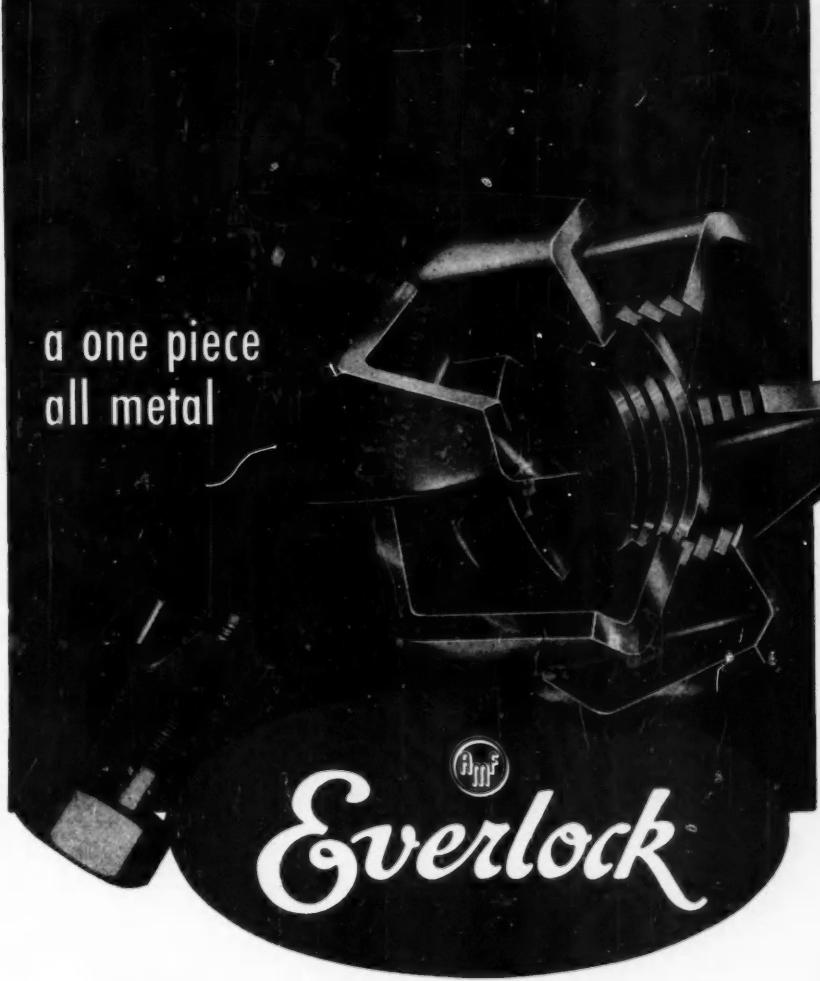
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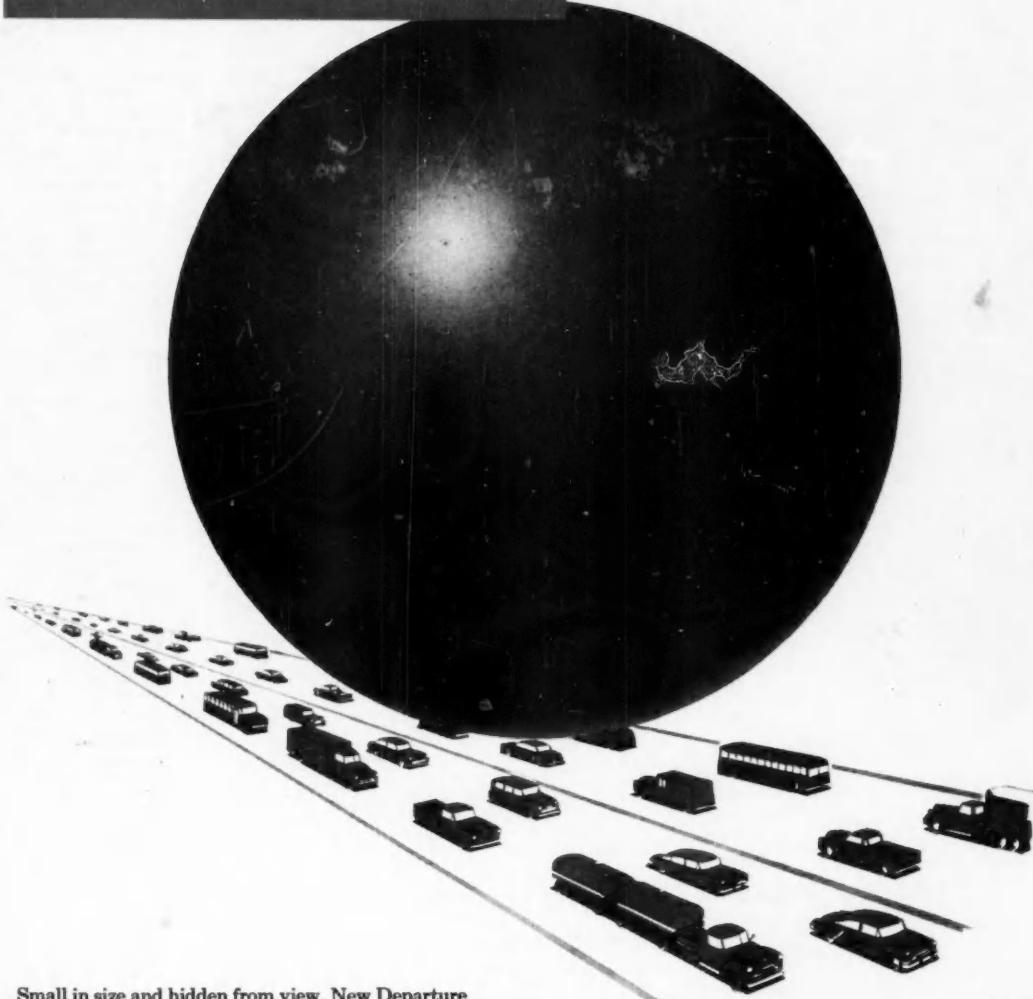
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